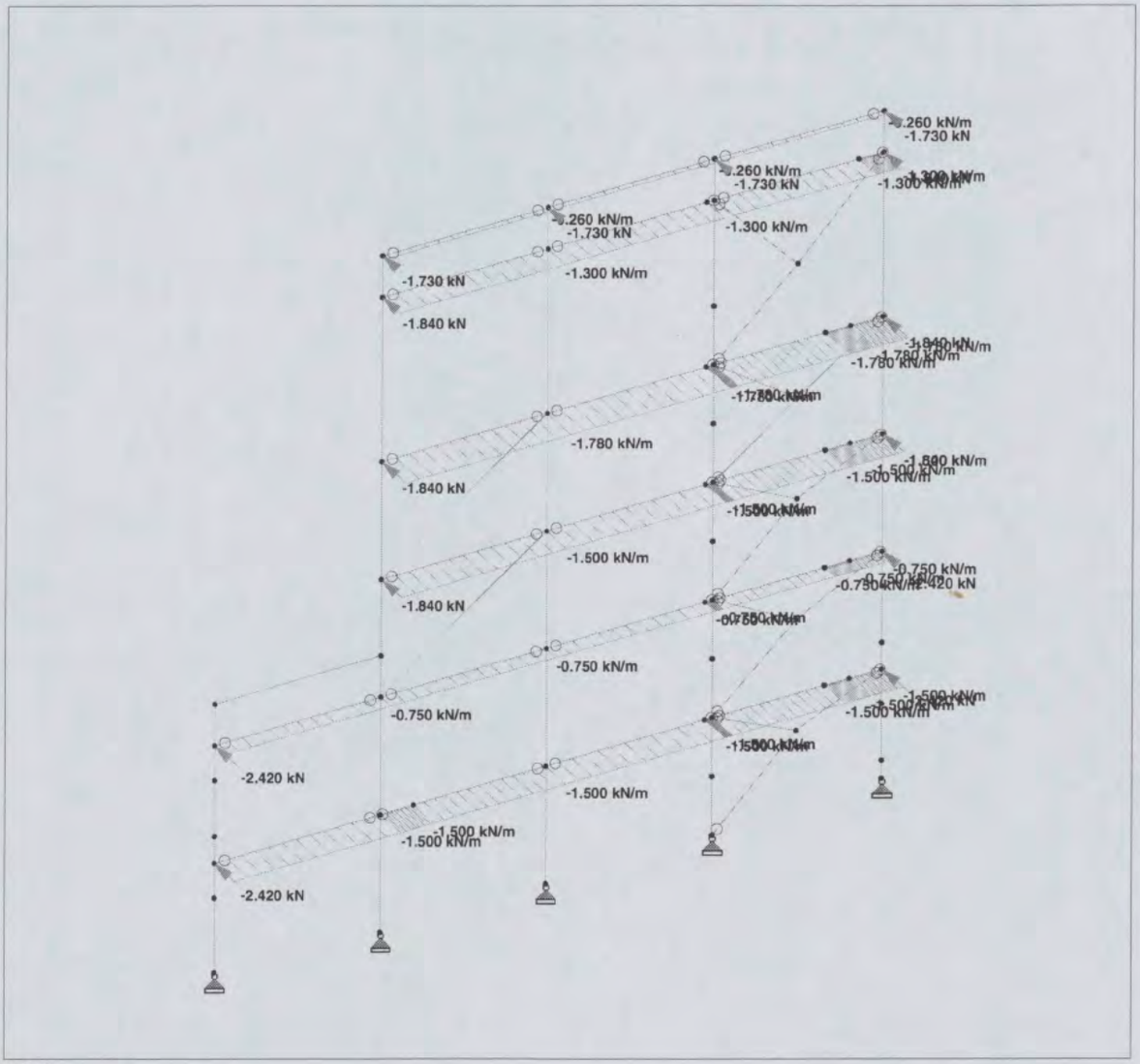
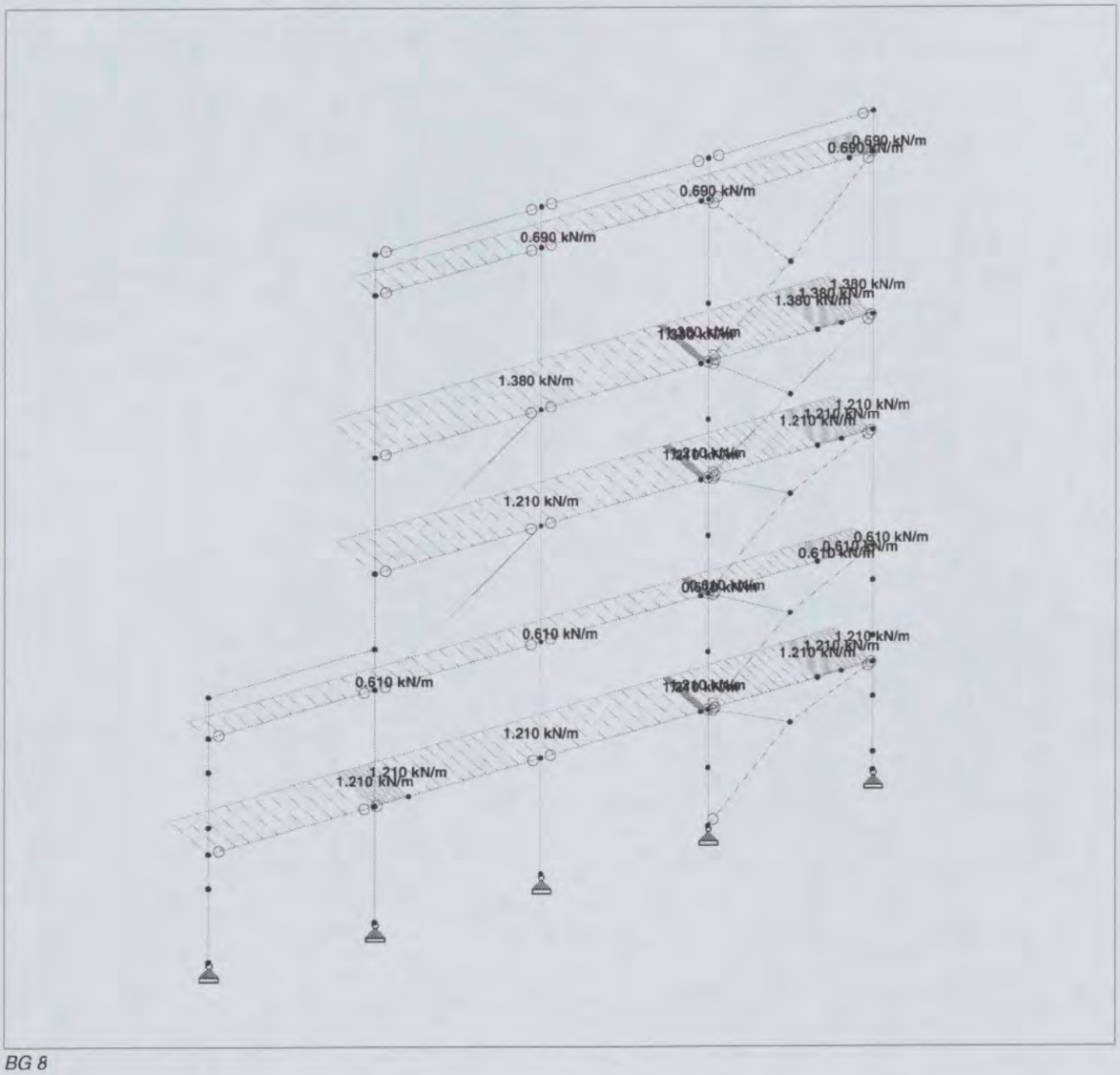


BG 7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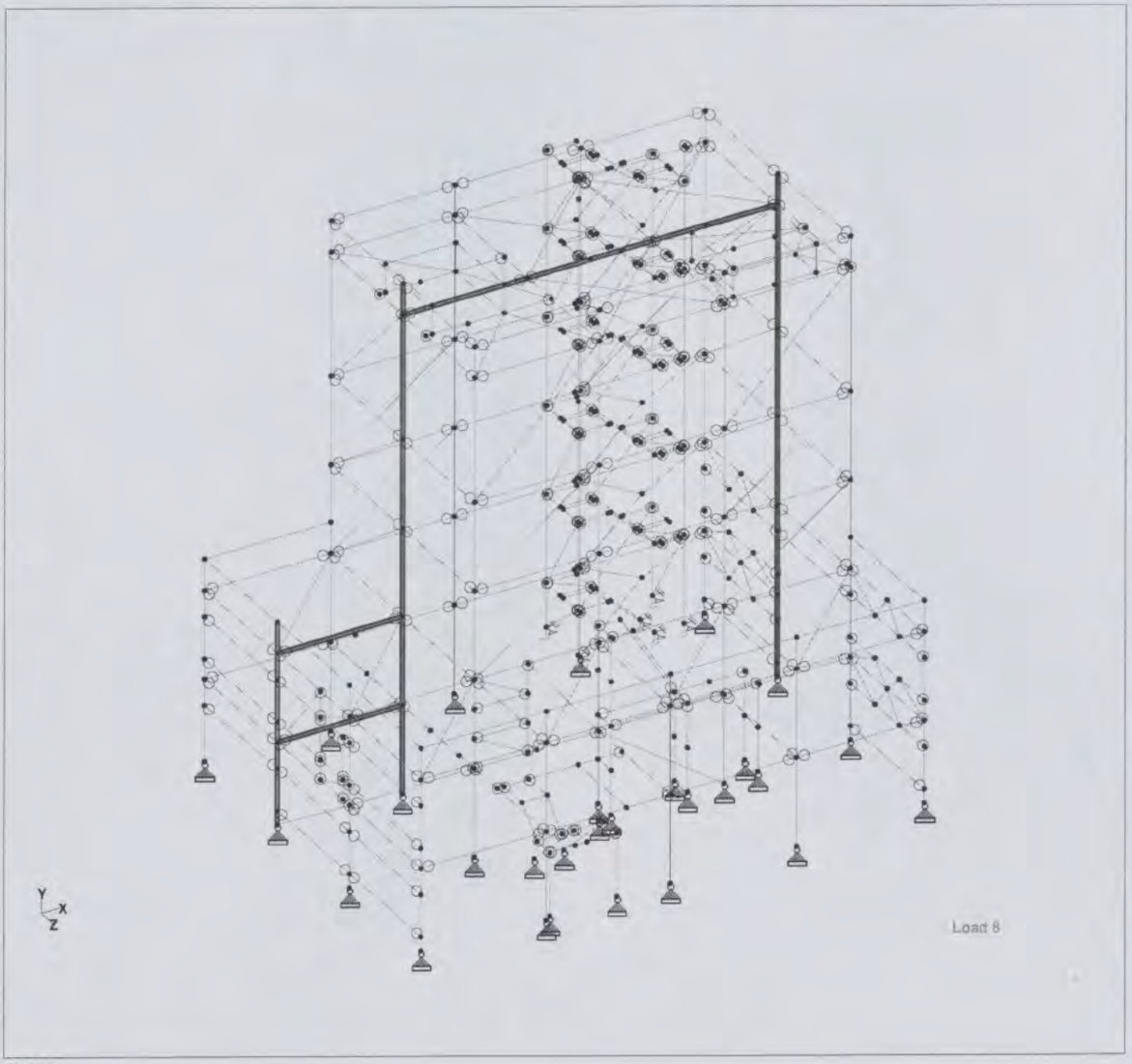
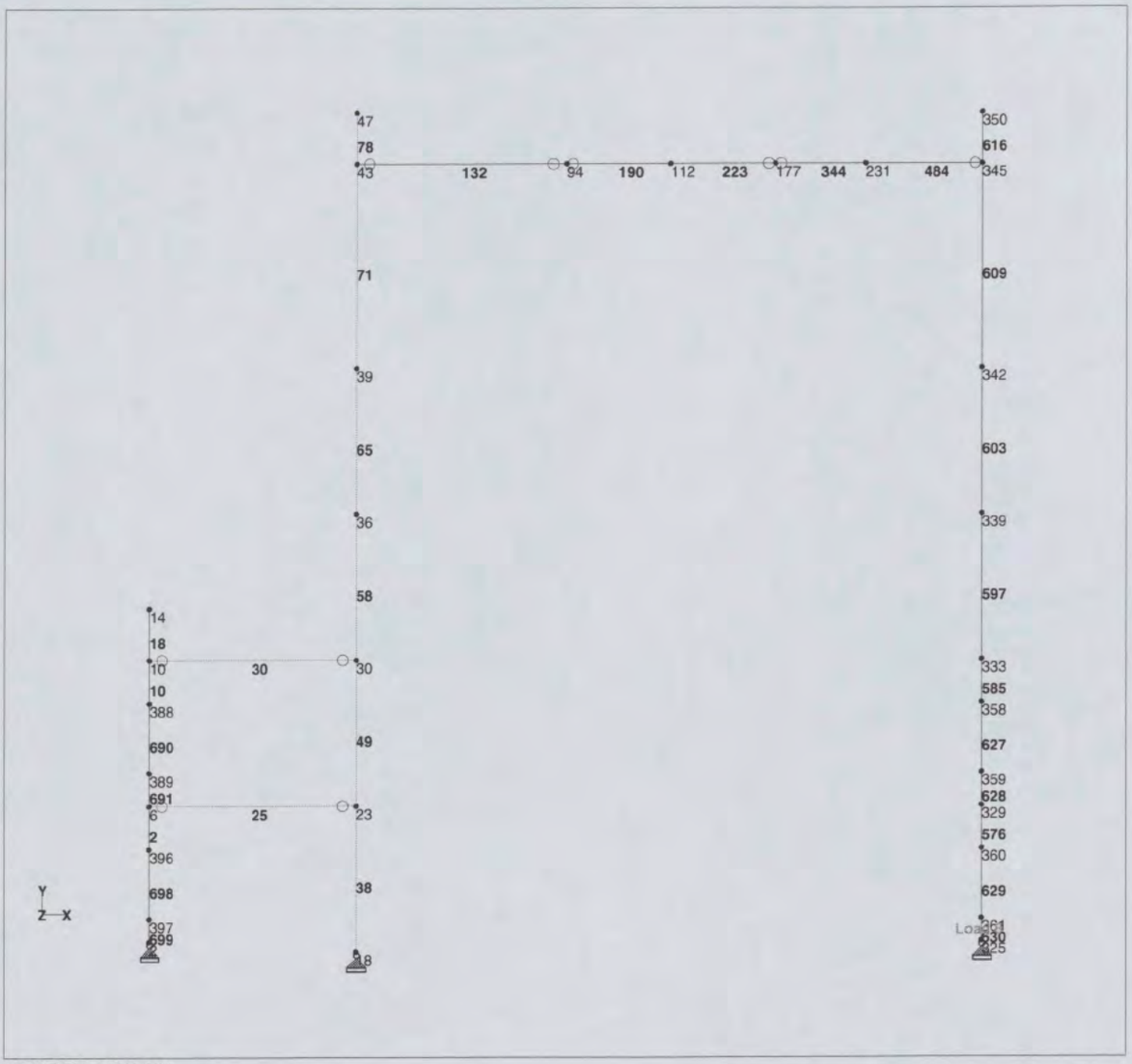
0.690 kN/m
0.690 kN/m
1.380 kN/m
1.380 kN/m
1.380 kN/m
1.210 kN/m
1.210 kN/m
1.210 kN/m
0.610 kN/m
0.610 kN/m
0.610 kN/m
1.210 kN/m
1.210 kN/m
1.210 kN/m
1.210 kN/m

BG 8

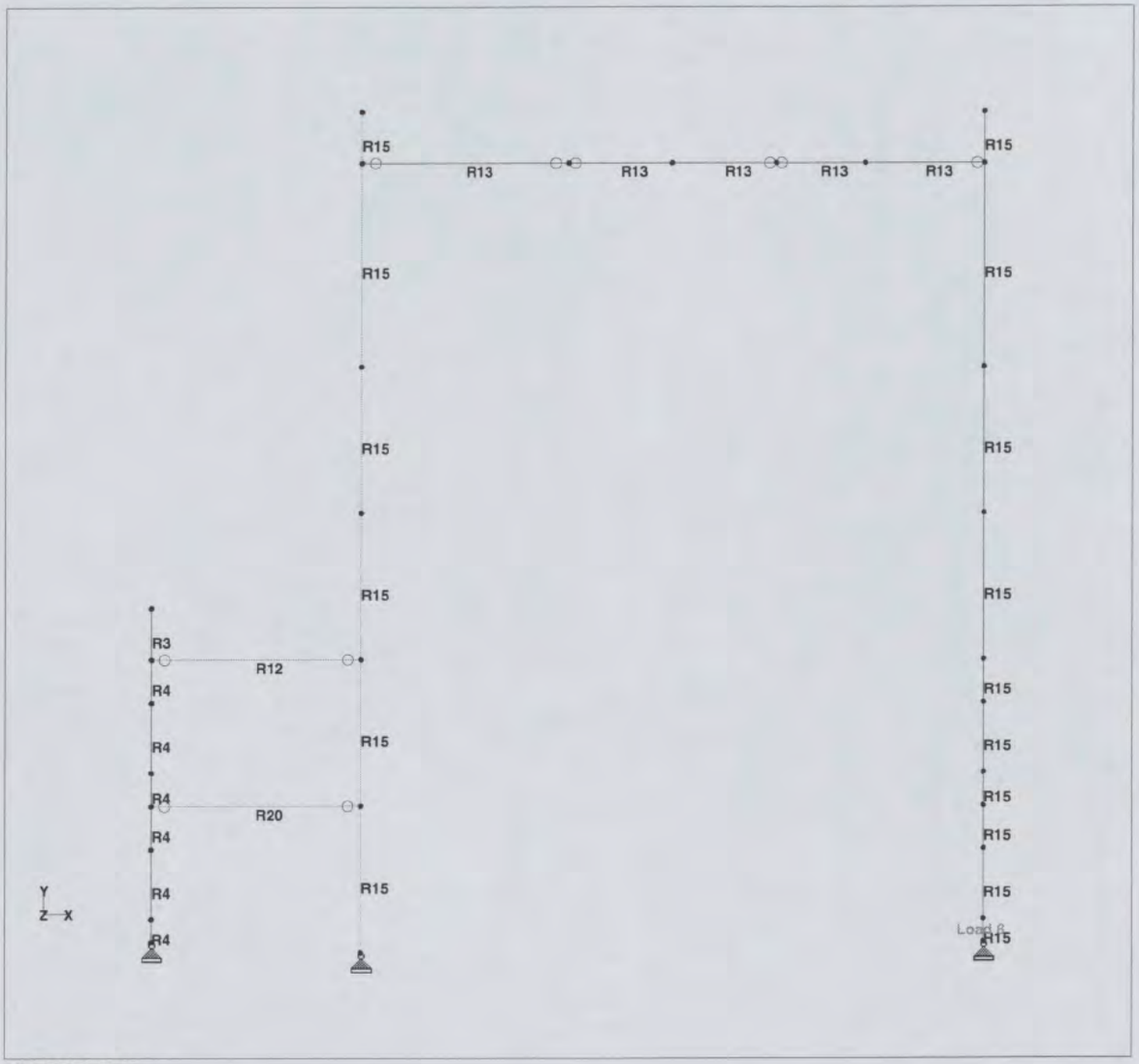
CUMAE B.V. **Model Model 8 - 12-12-2007** Software licensed to Cumae B.V.	Job No **20051248.B**	Sheet No **116**	Rev
	Part STAALCONSTRUCTIE PROEFFABRIEK		
Job Title SHELL GLOBAL SOLUTIONS	Ref 04B020		
	By [redacted] Date 07-Jun-07 Chd [redacted]		
Client [redacted]	File Model 8.std	Date/Time 10-Dec-2007 14:22	



RIJ B



KNOPEN, STAVEN



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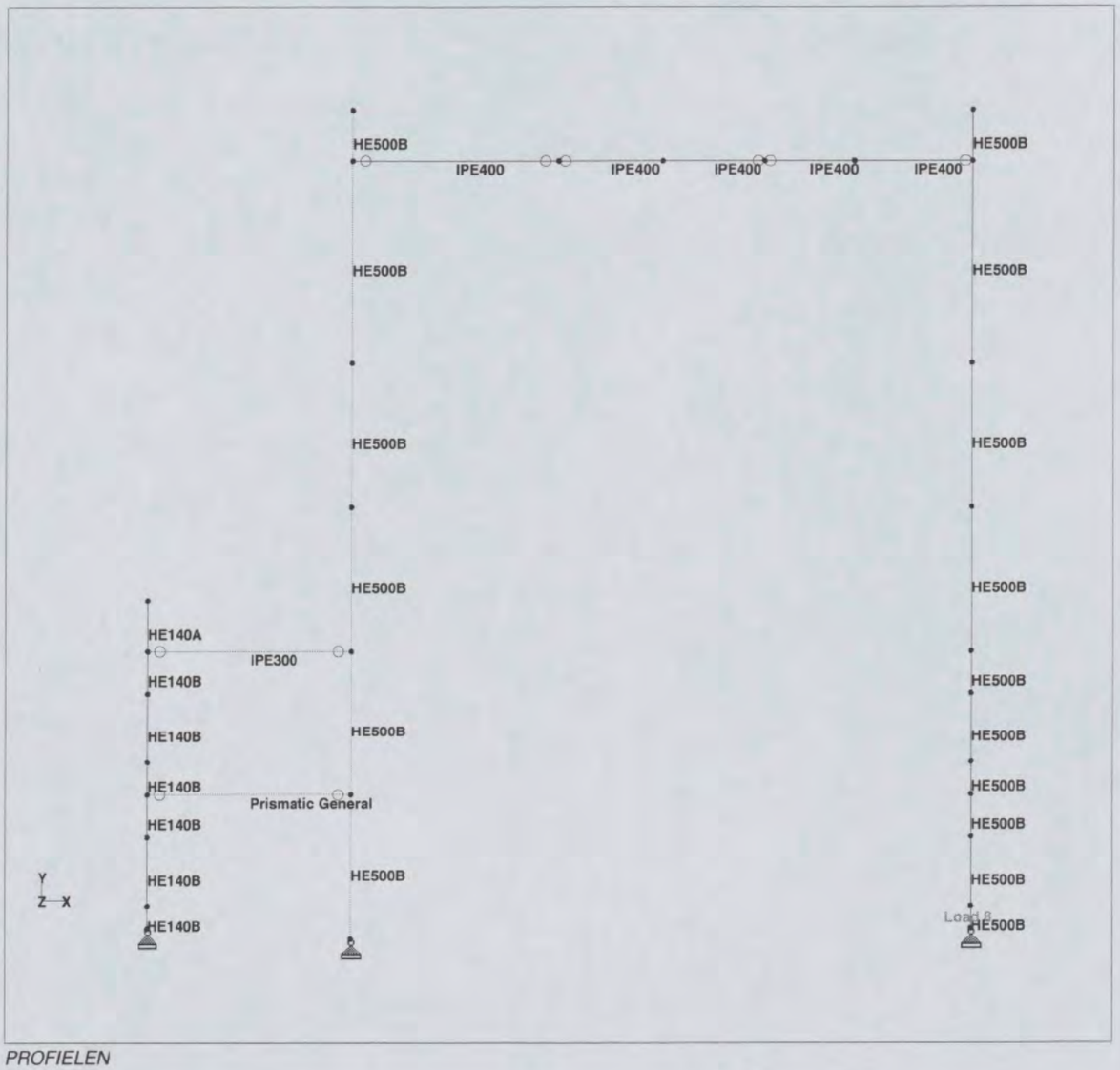
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IPE400
IPE400
IPE400
IPE400
IPE400
HE500B
HE500B
HE500B
HE500B
HE500B
HE500B
HE500B
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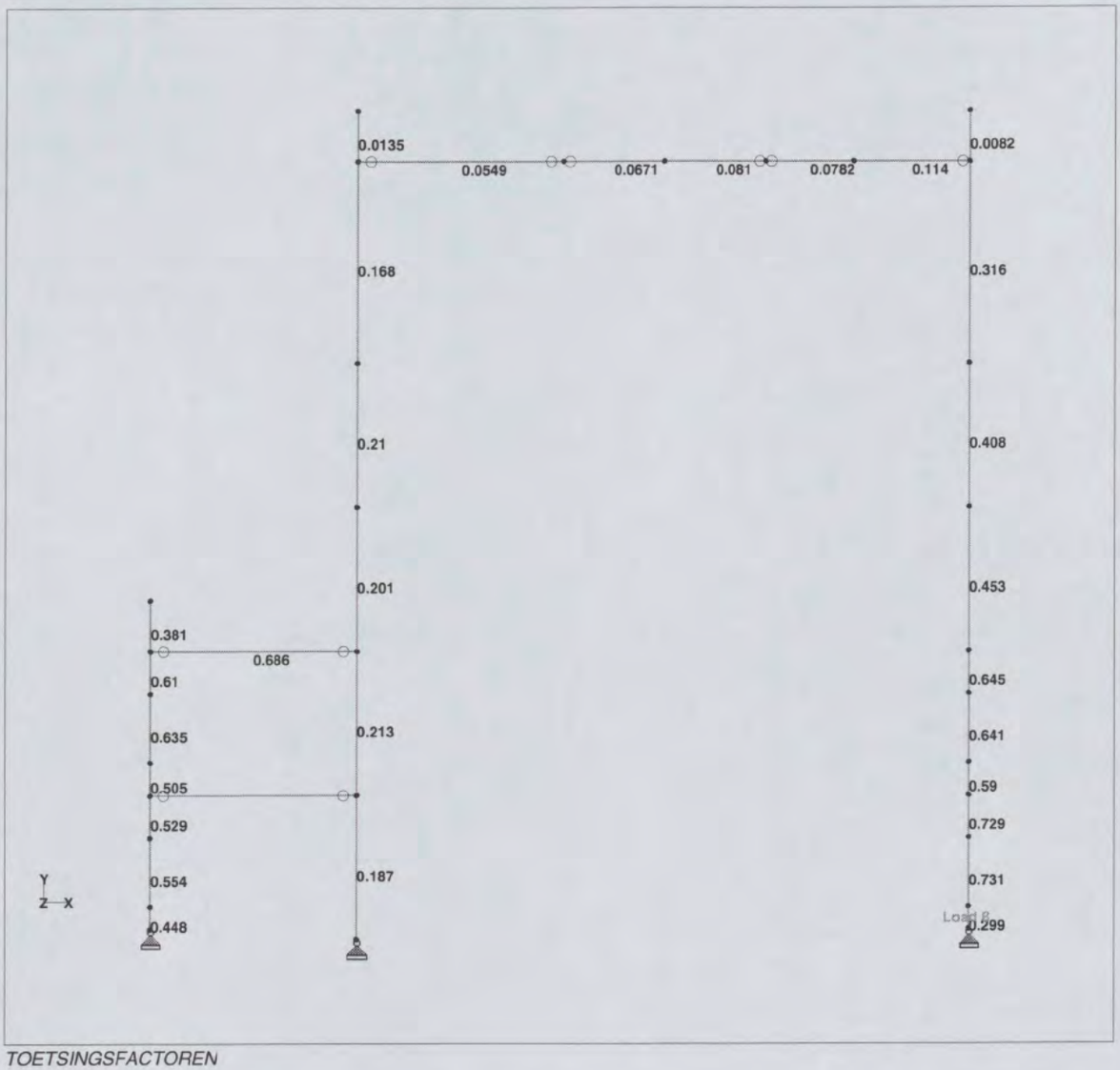
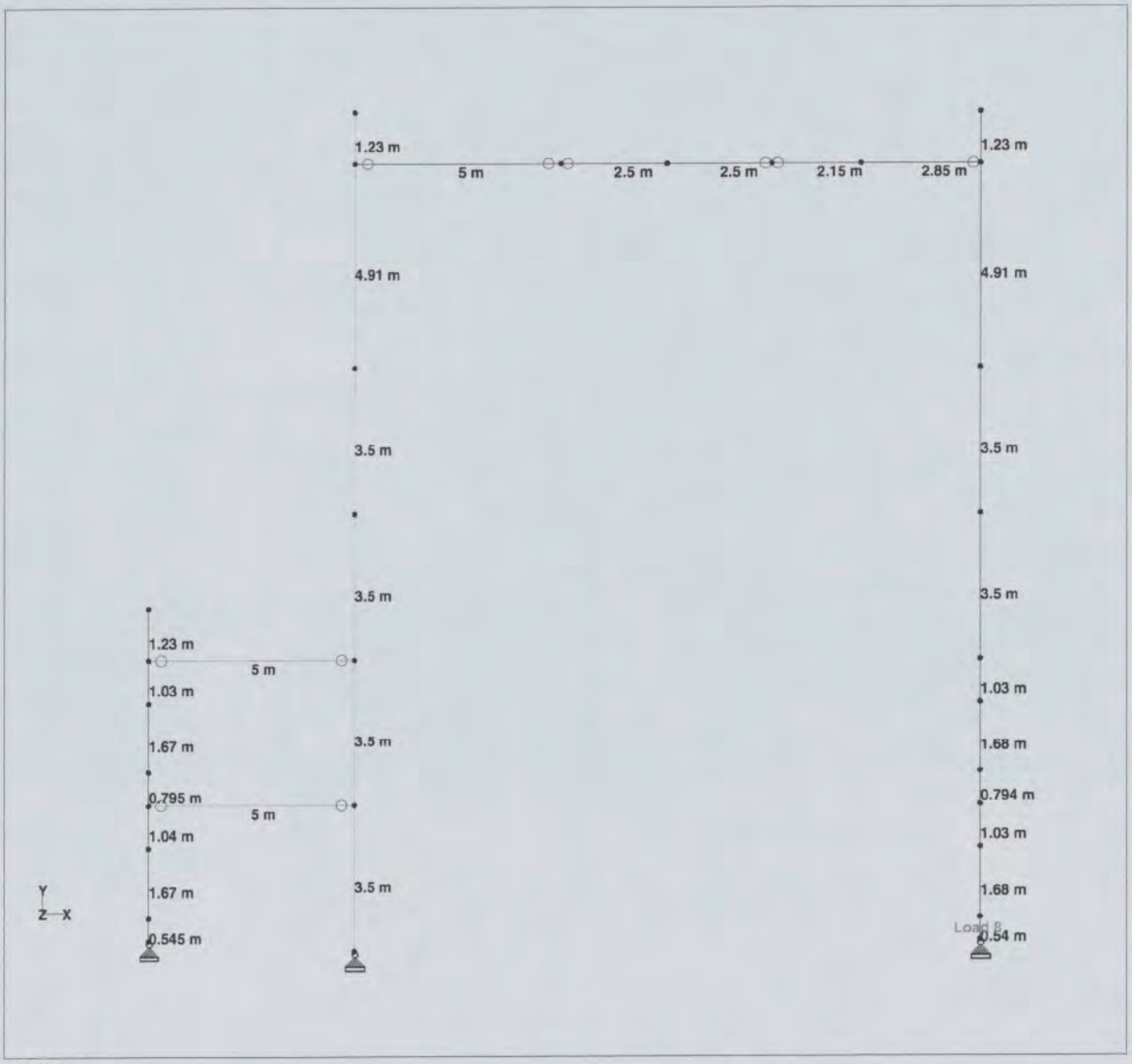
HE500B
HE500B
HE500B
HE500B
HE500B
HE500B
HE500B
HE500B
HE500B
HE140A
IPE300
HE140B
HE140B
HE140B
Prismatic General
HE140B
HE140B
HE140B
Y
Z
X
Load 8

PROFIELEN



TOETSINGSFACTOREN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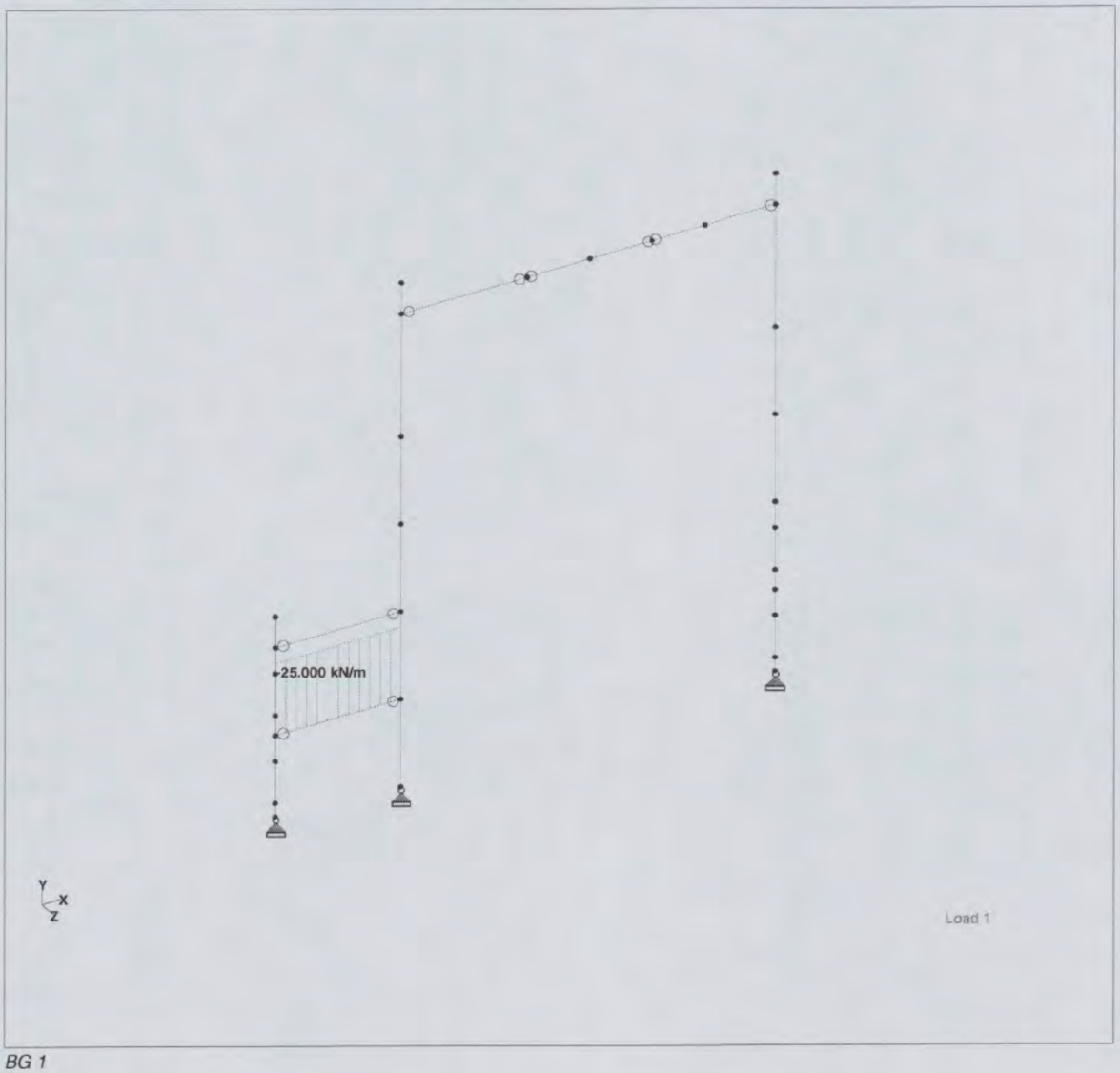
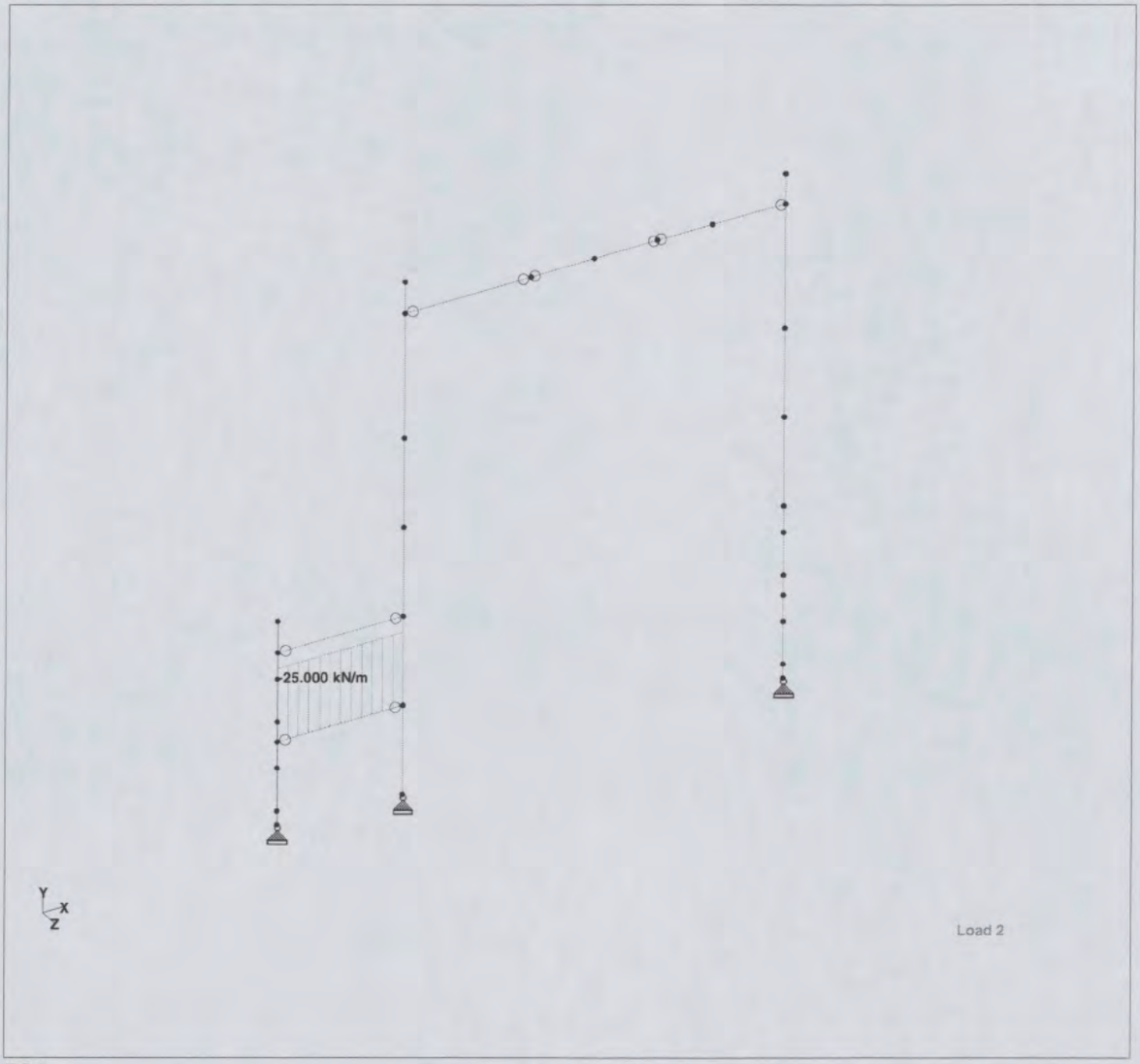
5 m
2.5 m
2.5 m
2.15 m
2.85 m
1.23 m
4.91 m
4.91 m
3.5 m
3.5 m
3.5 m
3.5 m
1.23 m
5 m
1.03 m
1.67 m
3.5 m
0.795 m
5 m
1.04 m
1.67 m
3.5 m
0.545 m
1.03 m
1.68 m
0.794 m
1.03 m
1.68 m
0.54 m
Y
Z
X
Load 8

MATEN

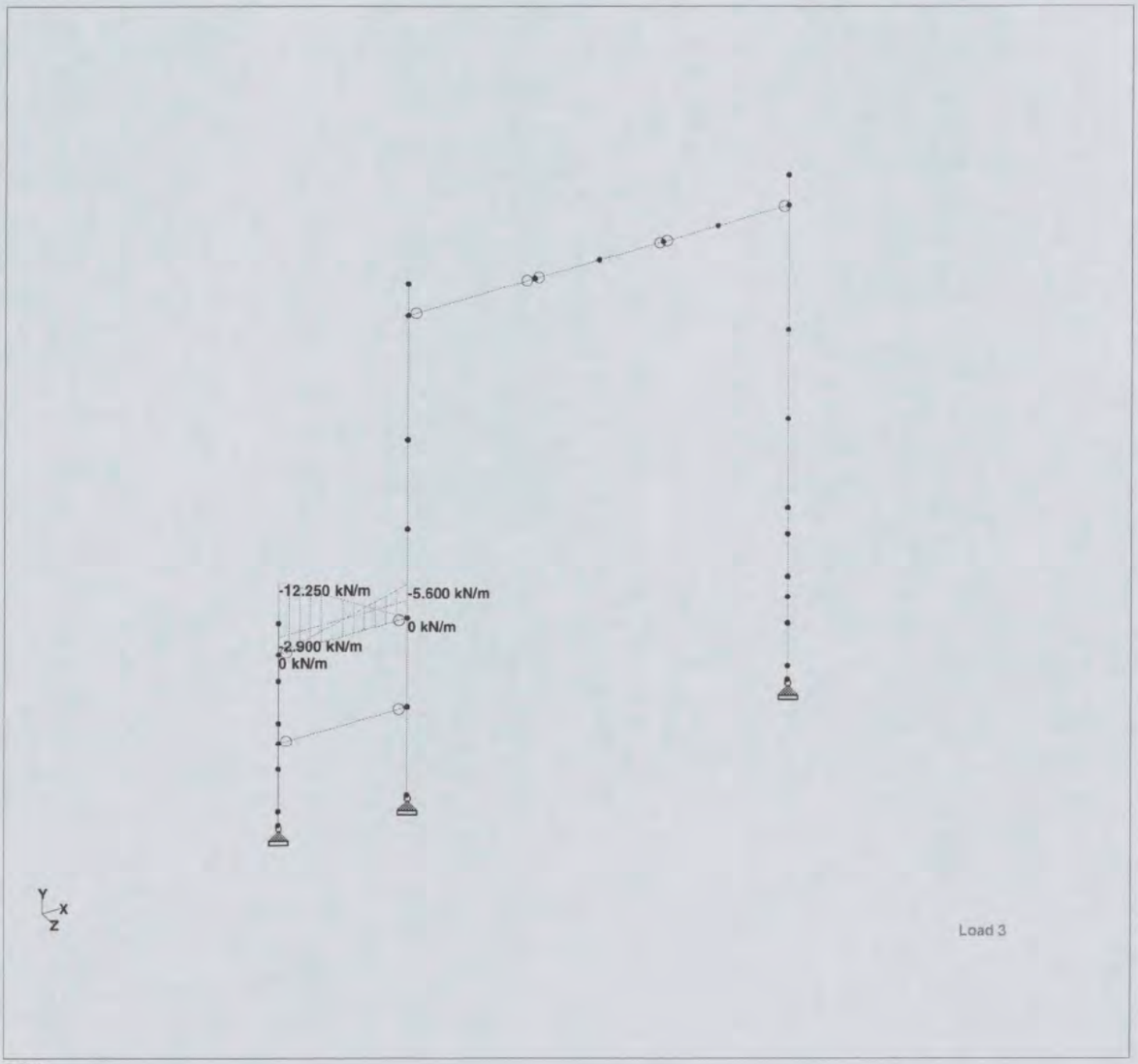


BG 1

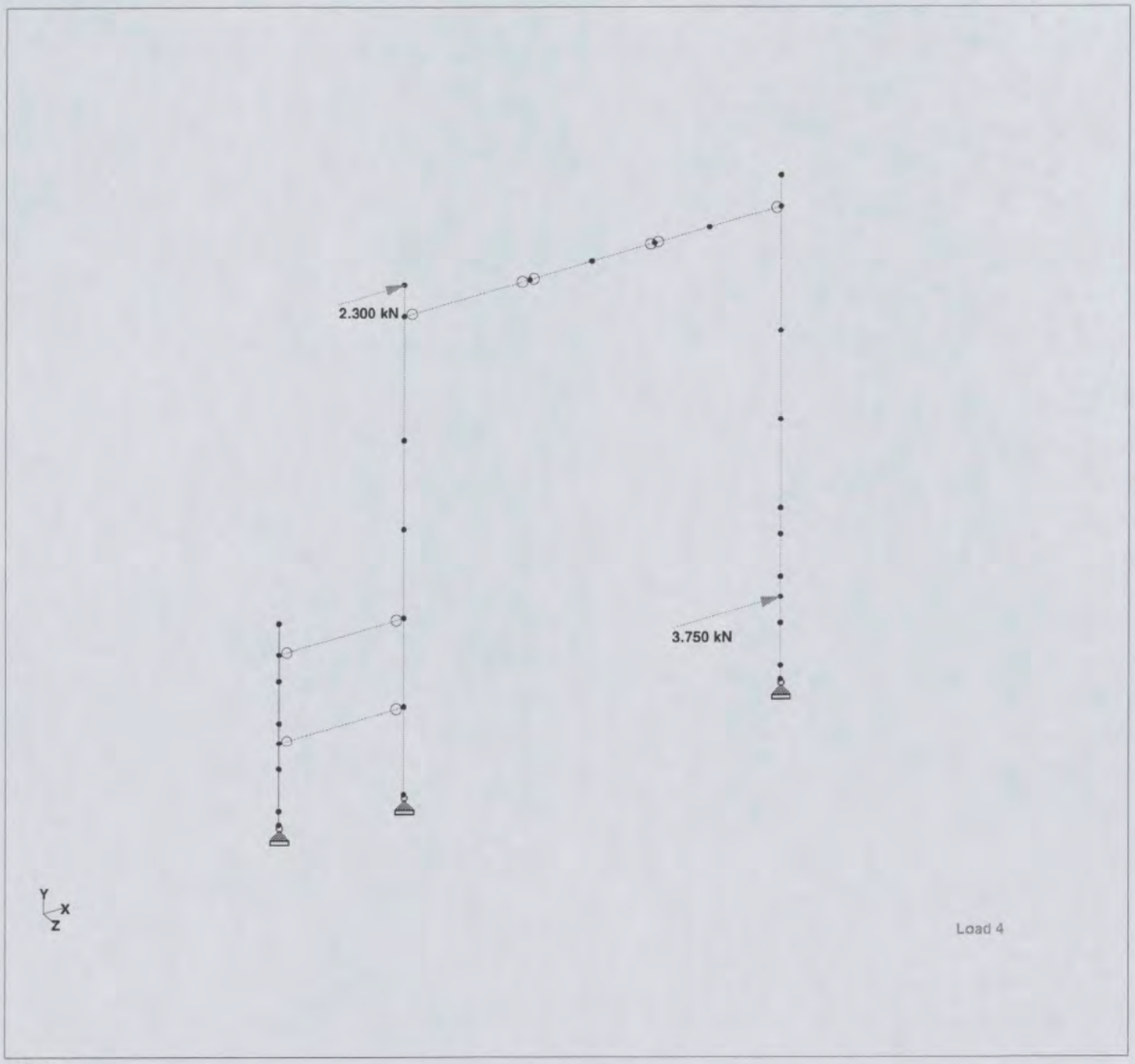
the scale towards document



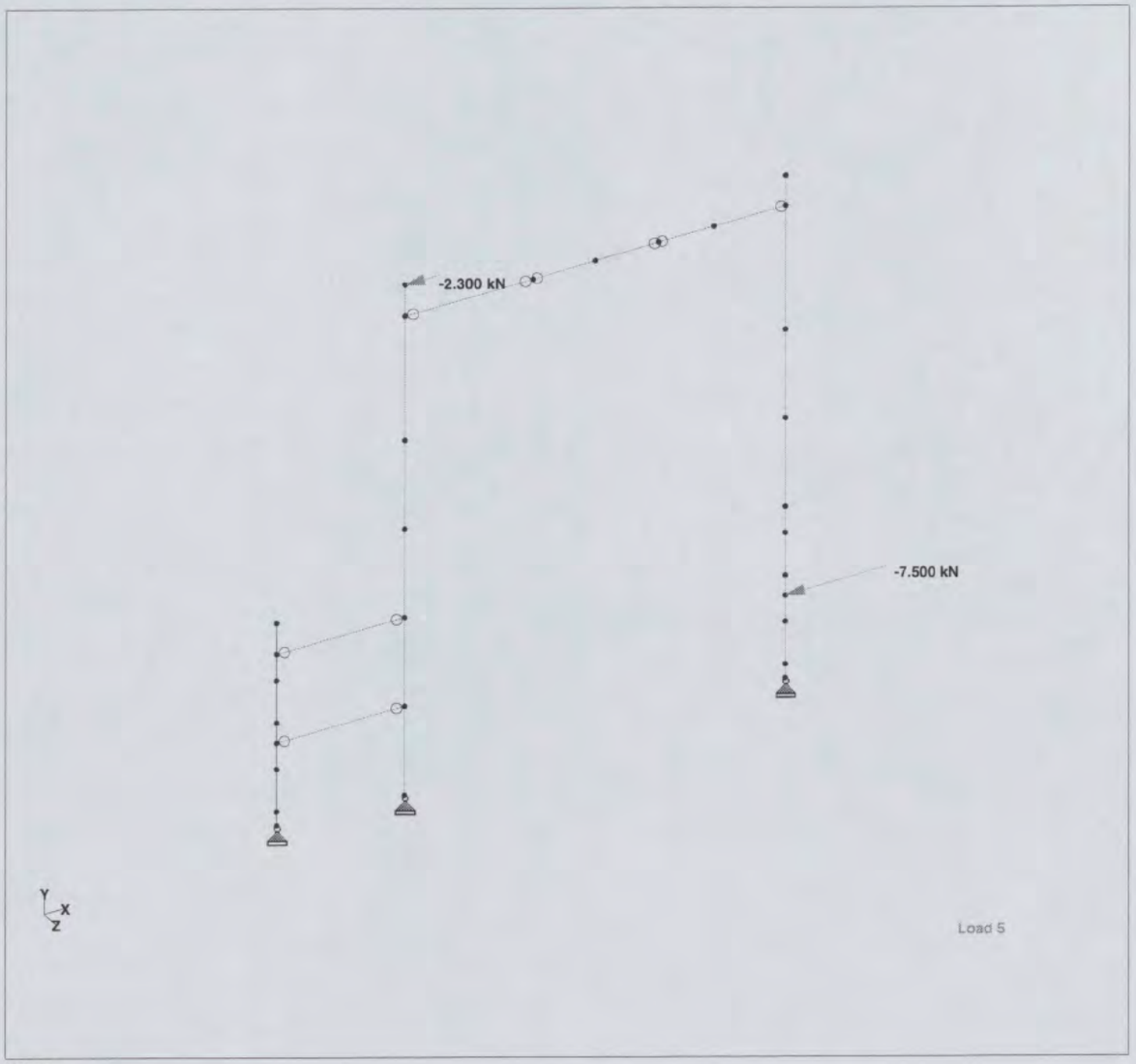
BG 2



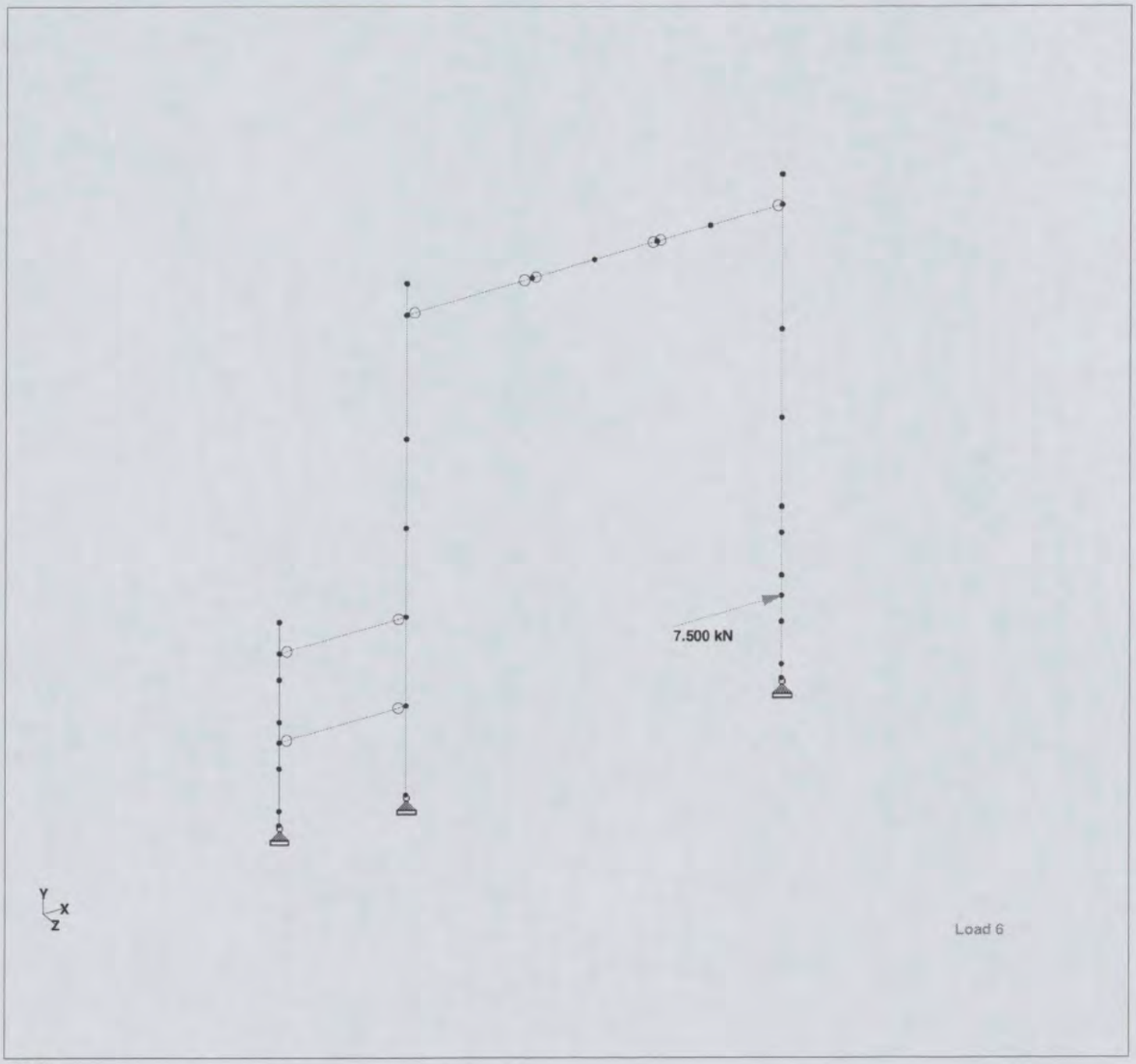
BG 3



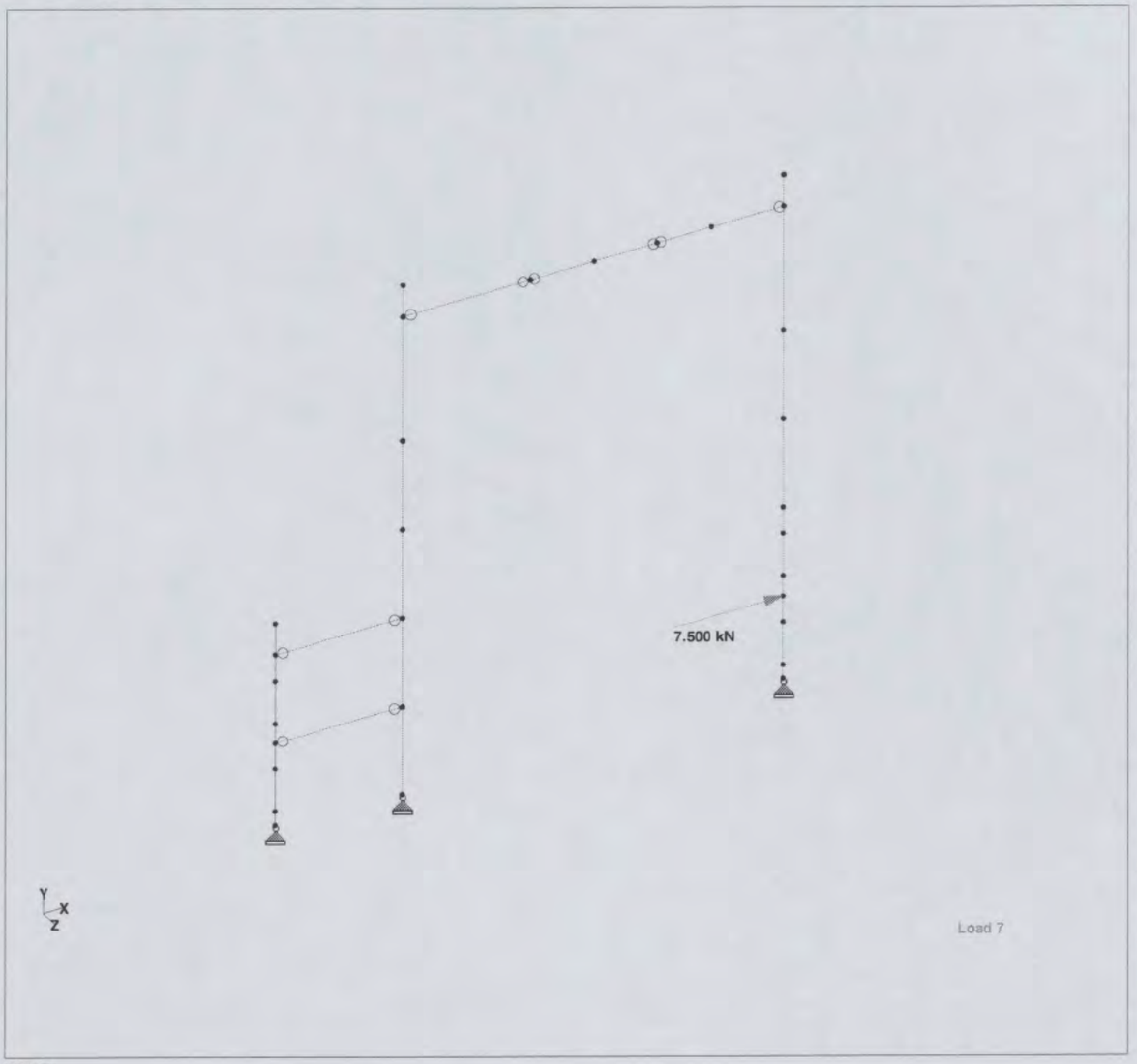
BG 4



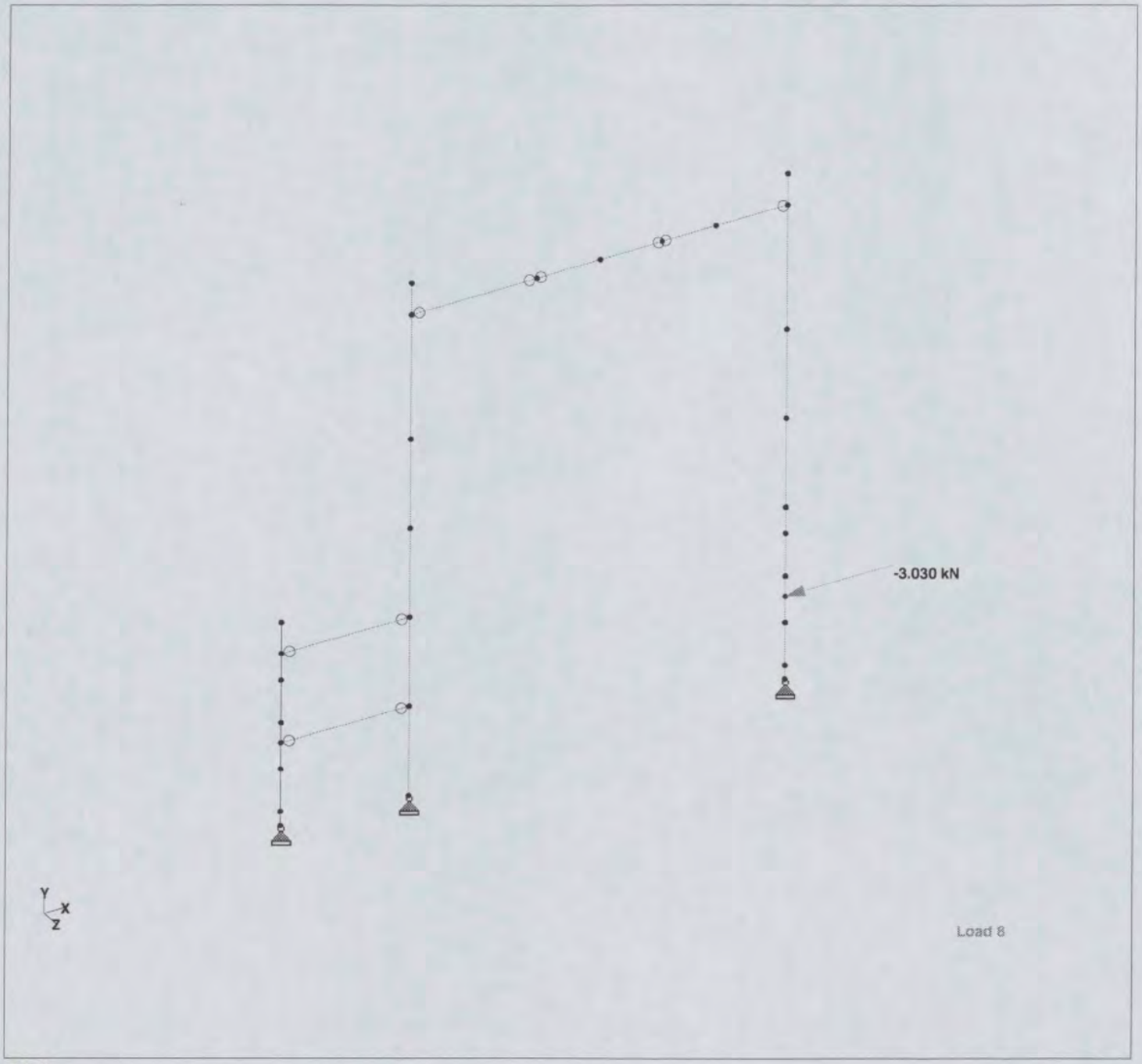
BG 5



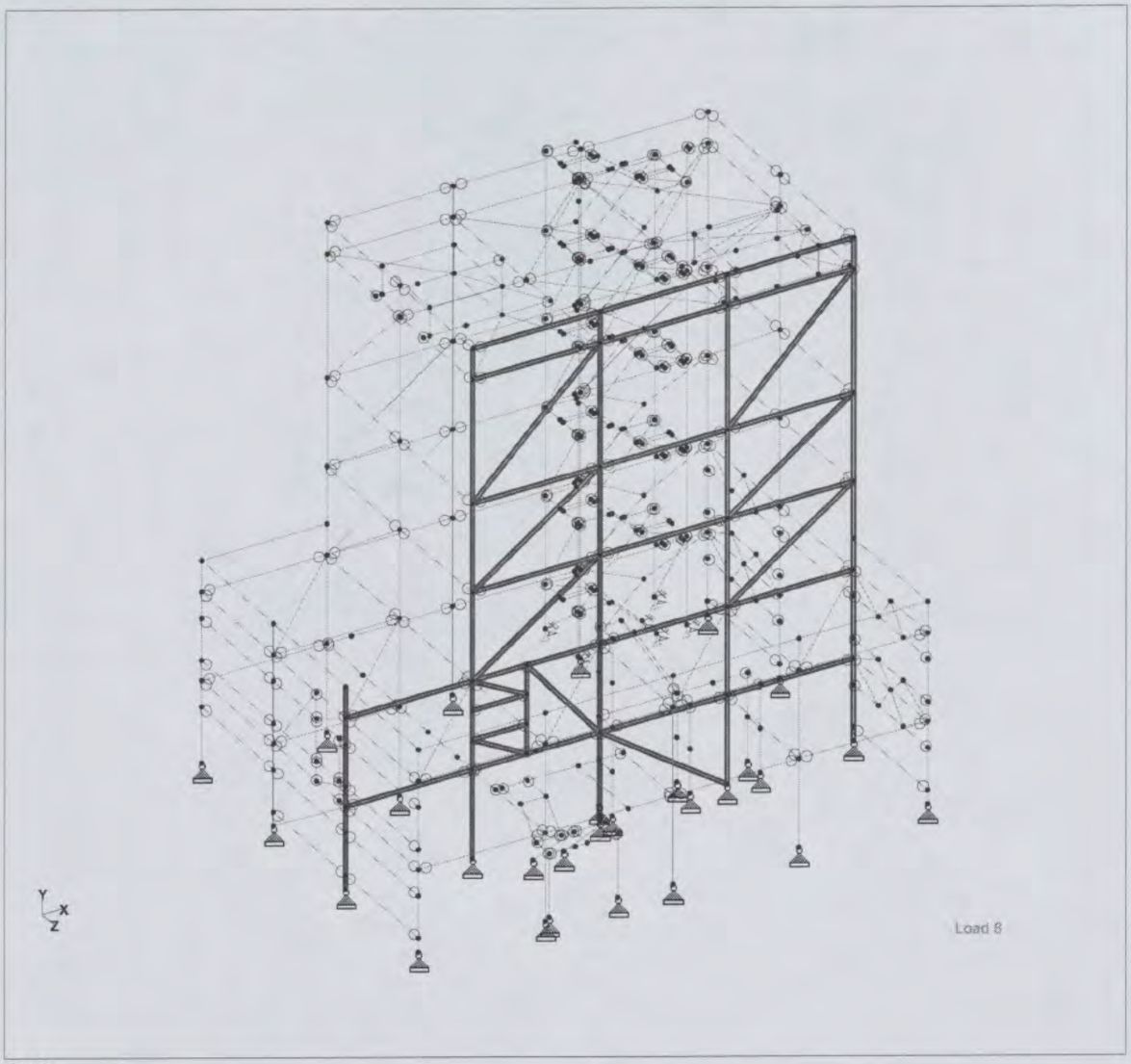
BG 6



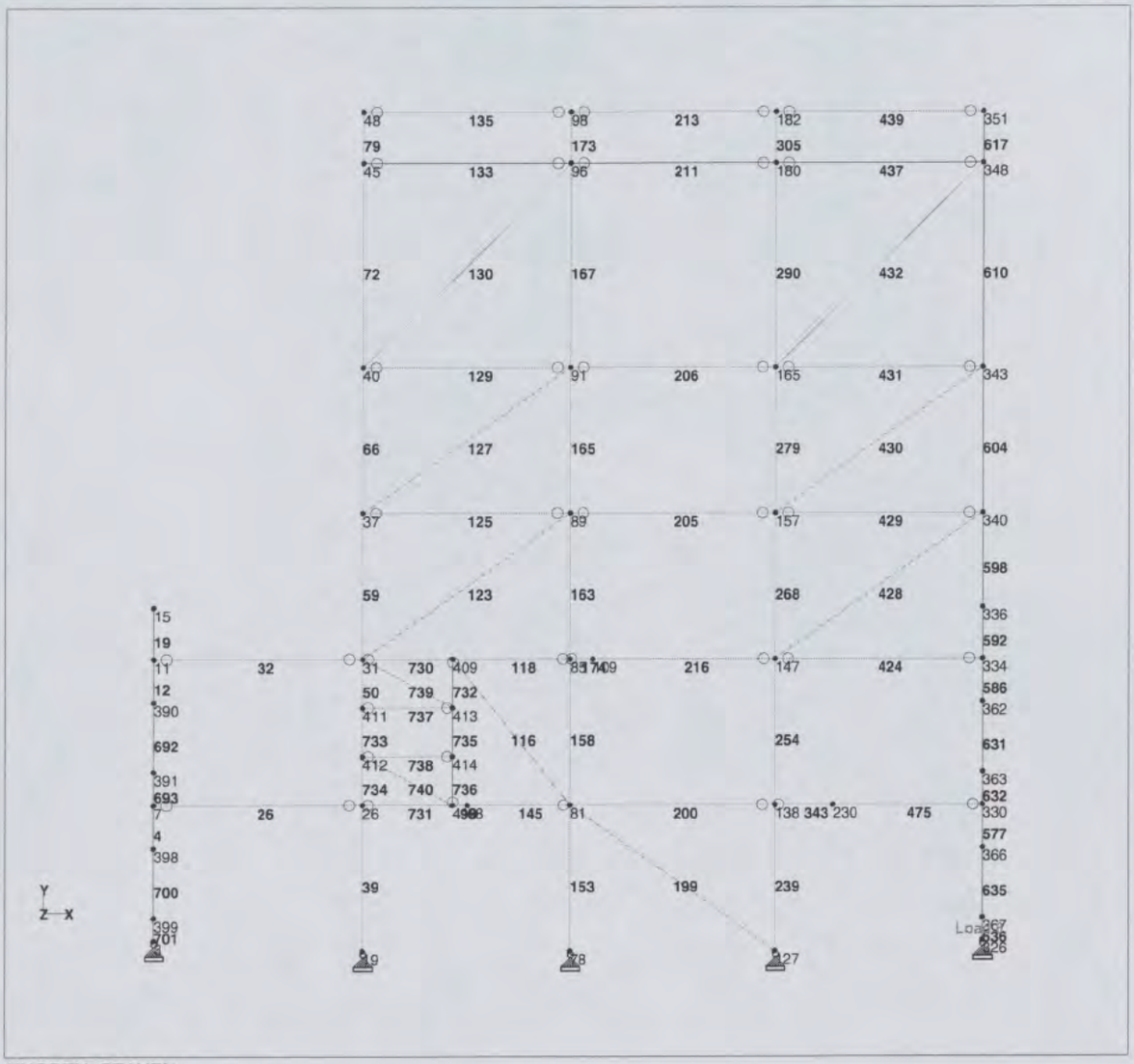
BG 7



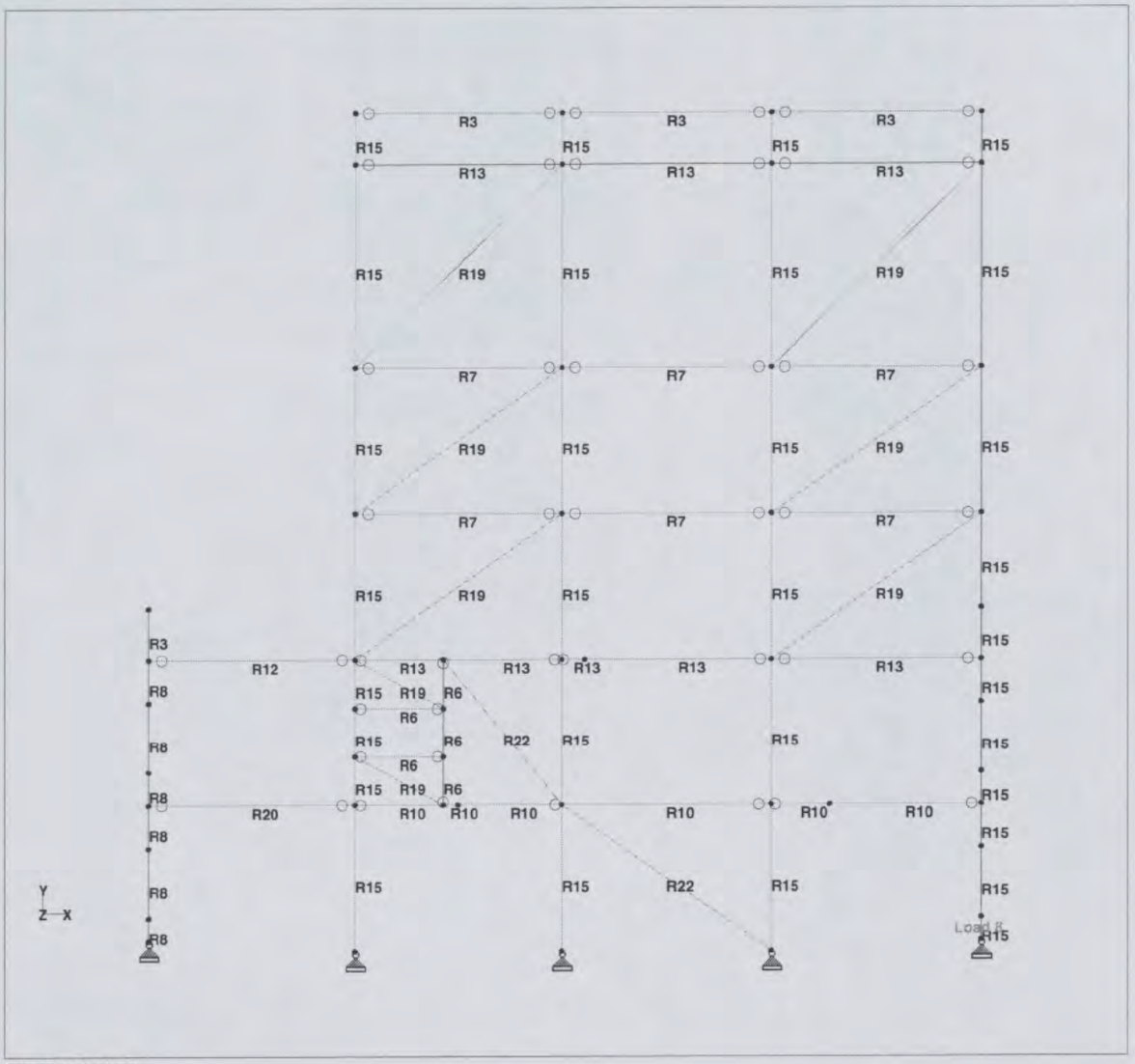
BG 8



RIJ C



KNOPEN, STAVEN



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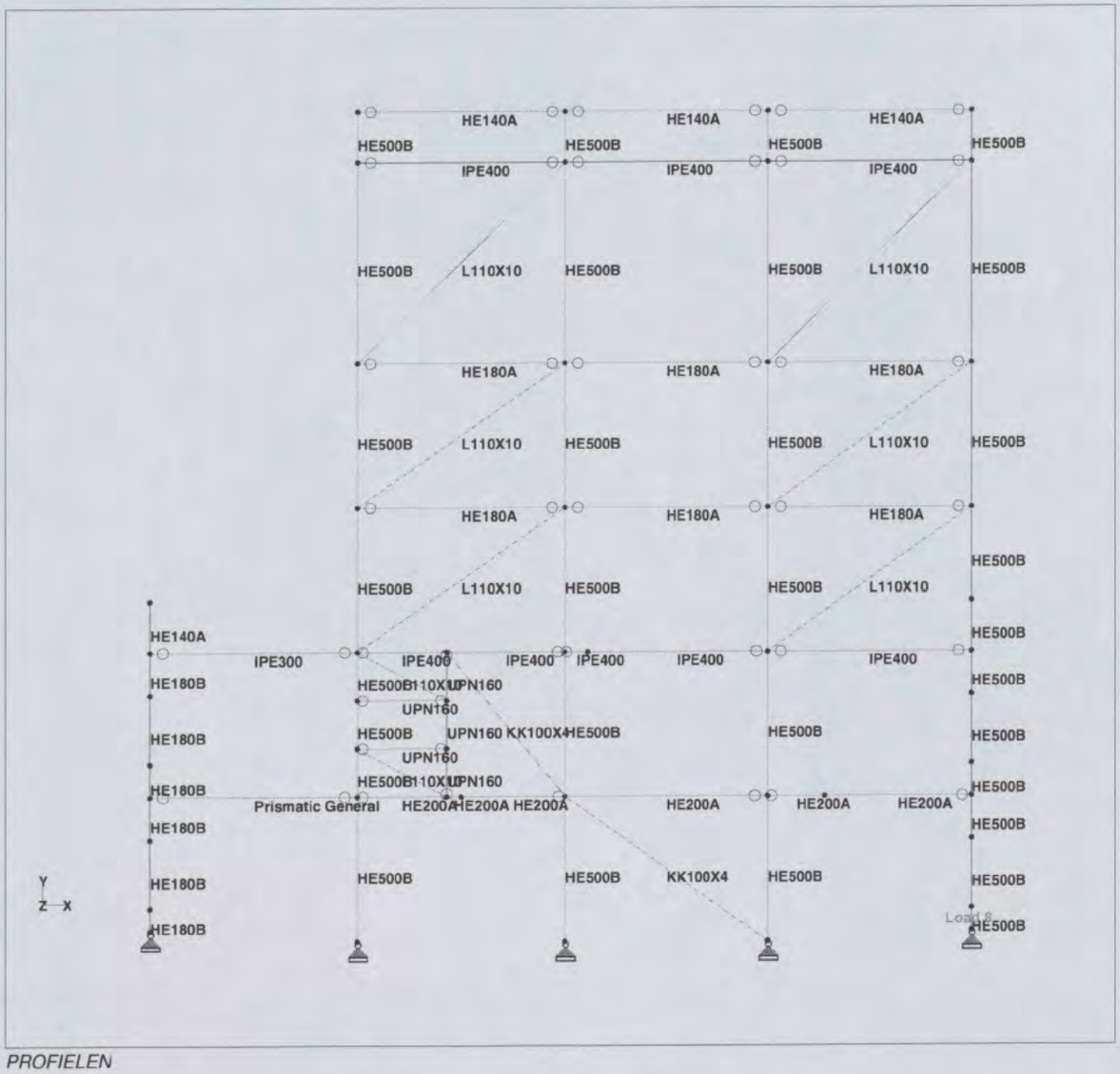
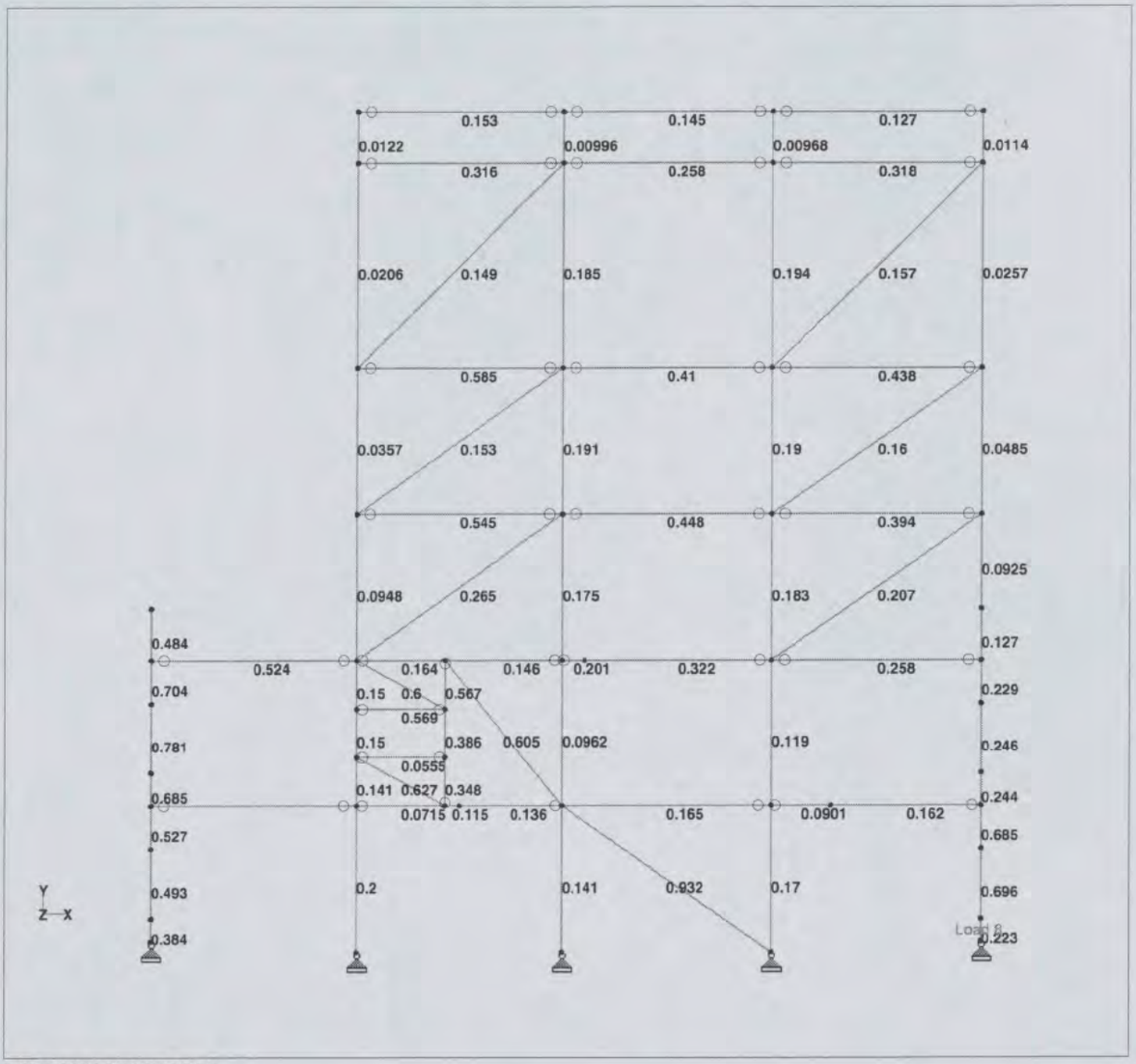
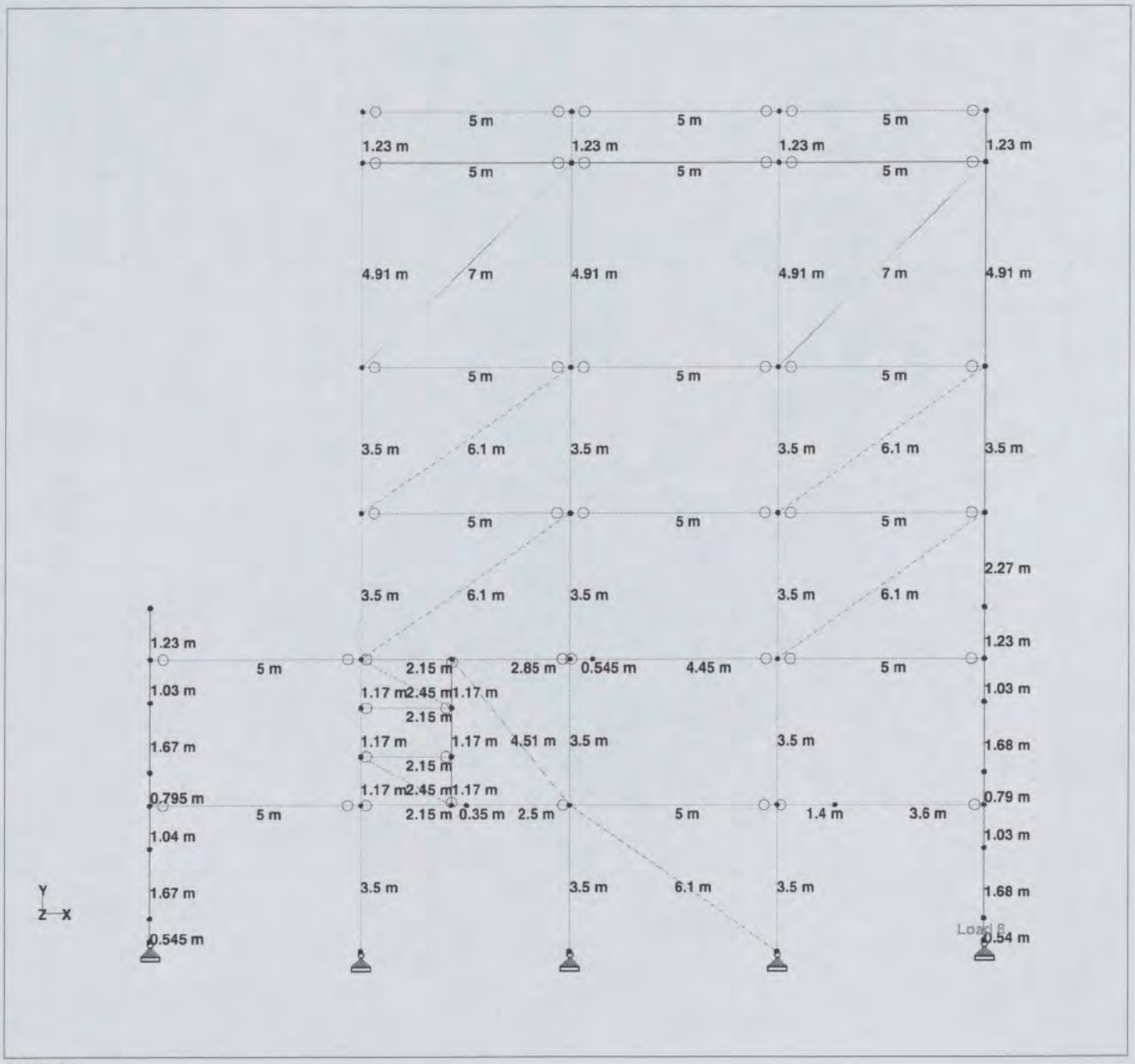

HE140A
HE500B
IPE400
L110X10
HE180A
IPE300
HE180B
UPN160
KK100X4
Prismatic General
HE200A
Load 8
Y
Z
X

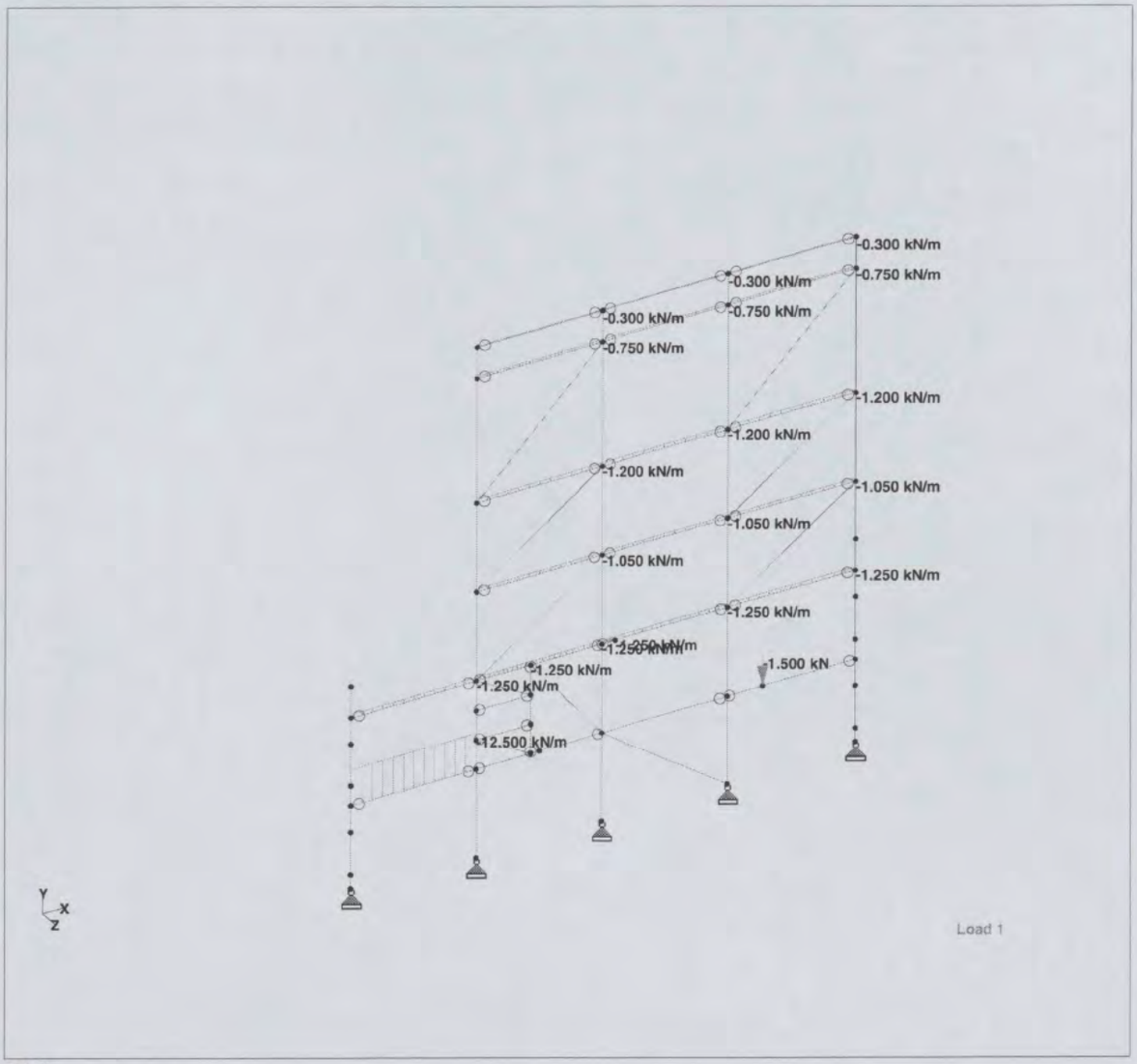
PROFIELEN



TOETSINGSFACTOREN


5 m
1.23 m
4.91 m
7 m
3.5 m
6.1 m
2.27 m
1.03 m
1.67 m
0.795 m
1.04 m
0.545 m
2.15 m
2.85 m
0.545 m
4.45 m
1.17 m
2.45 m
4.51 m
0.35 m
2.5 m
1.4 m
3.6 m
1.68 m
0.79 m
0.54 m
Y
Z
X

MATEN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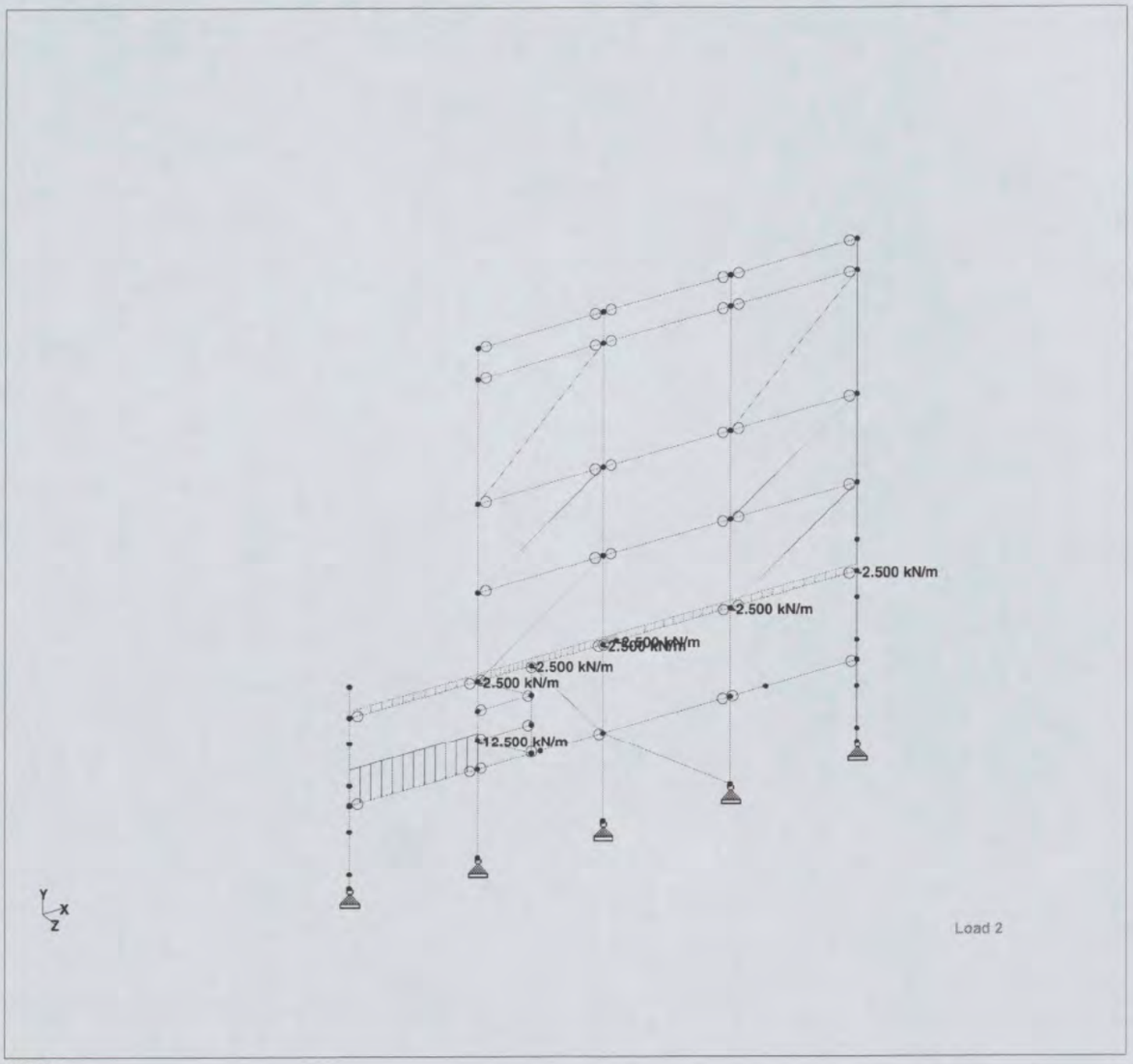
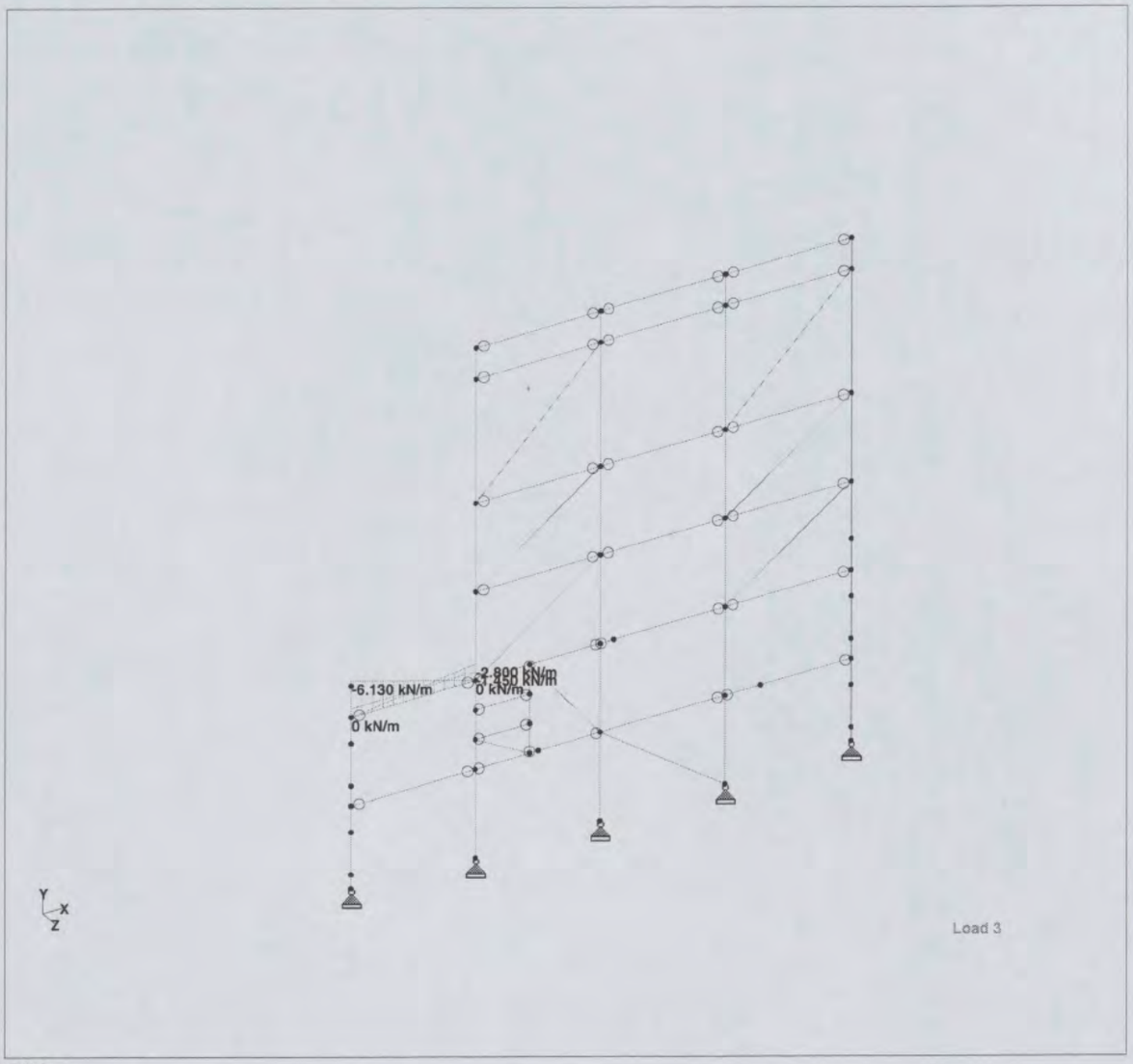
-0.750 kN/m
-1.200 kN/m
-1.050 kN/m
-1.250 kN/m
-1.500 kN
-12.500 kN/m
Y
X
Z
Load 1

BG 1

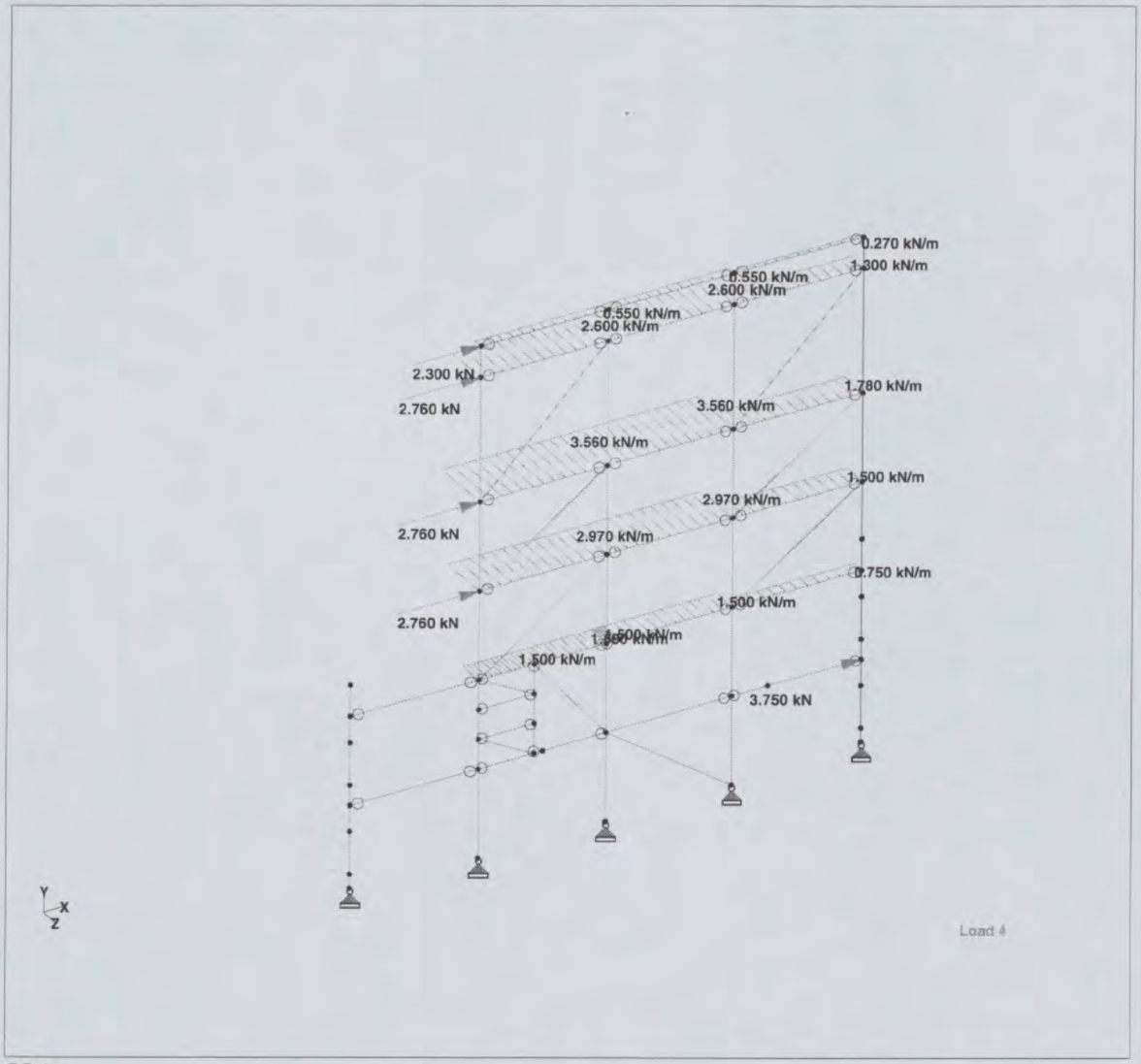

2.500 kN/m
2.500 kN/m
2.500 kN/m
2.500 kN/m
2.500 kN/m
12.500 kN/m
Y
X
Z
Load 2

BG 2



BG 3

the scale towards document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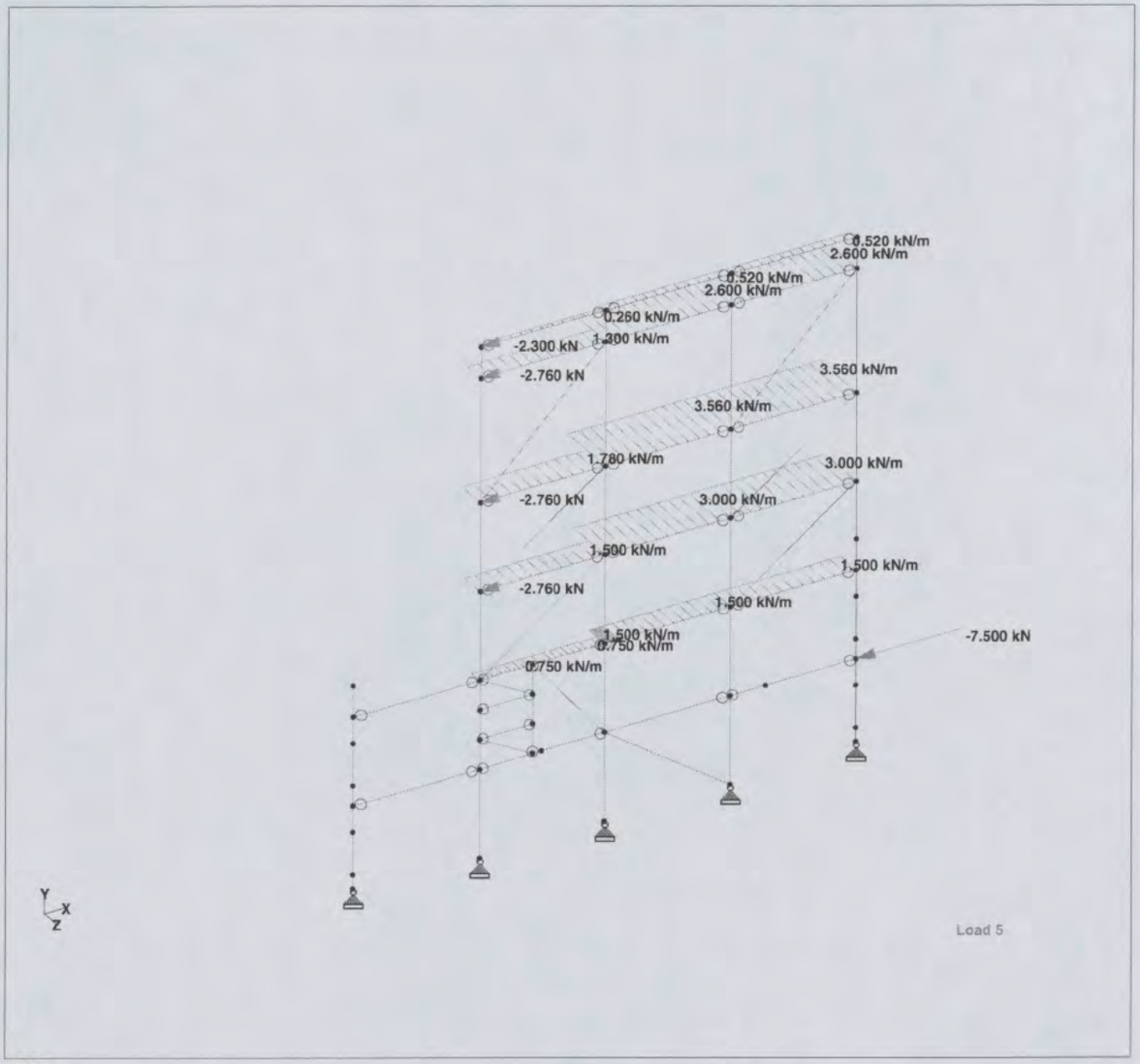
1.300 kN/m
0.550 kN/m
2.600 kN/m
0.550 kN/m
2.600 kN/m
2.300 kN
2.760 kN
1.780 kN/m
3.560 kN/m
3.560 kN/m
1.500 kN/m
2.970 kN/m
2.760 kN
2.970 kN/m
0.750 kN/m
1.500 kN/m
2.760 kN
1.500 kN/m
1.500 kN/m
3.750 kN
Y
X
Z
Load 4

BG 4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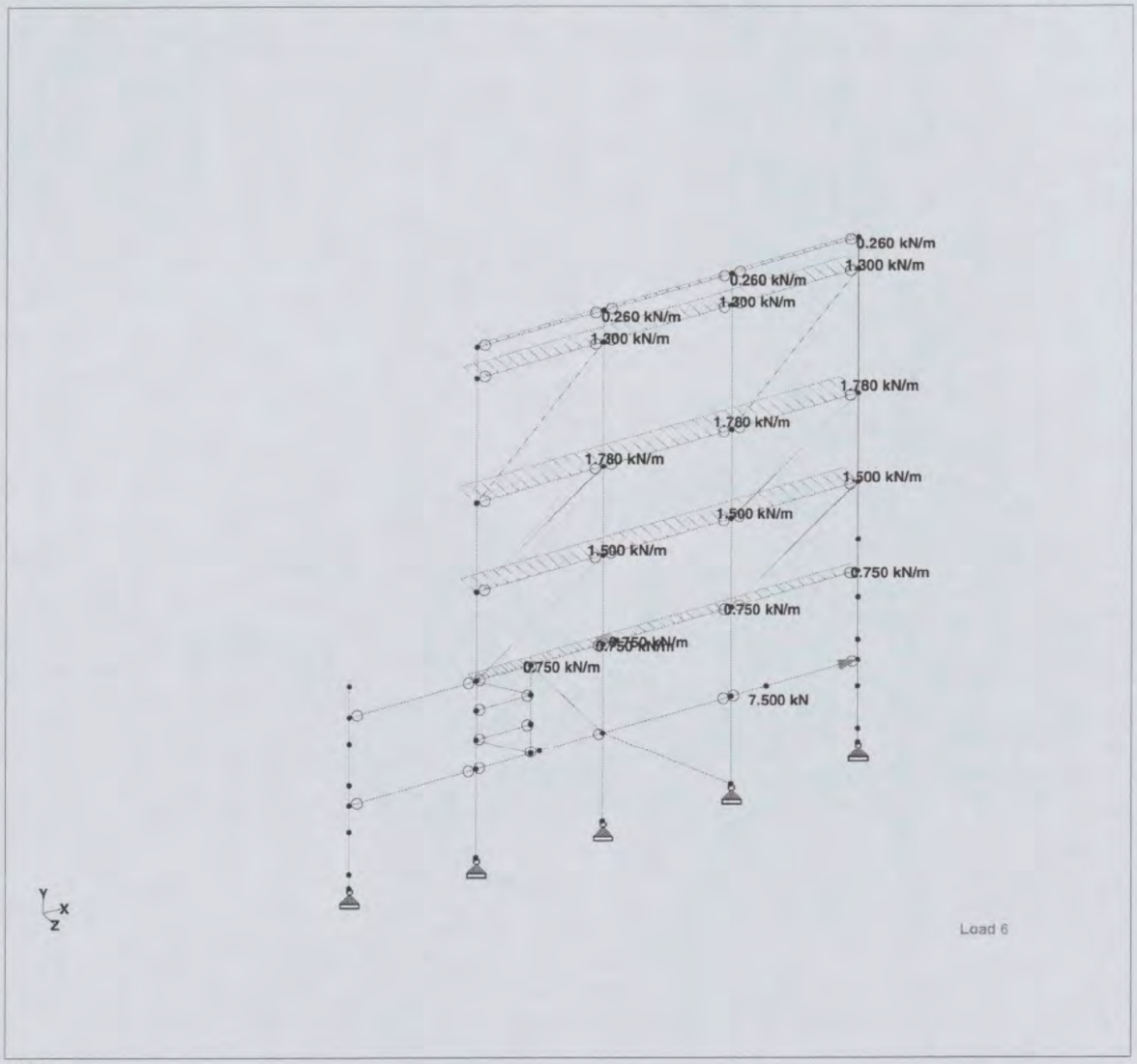
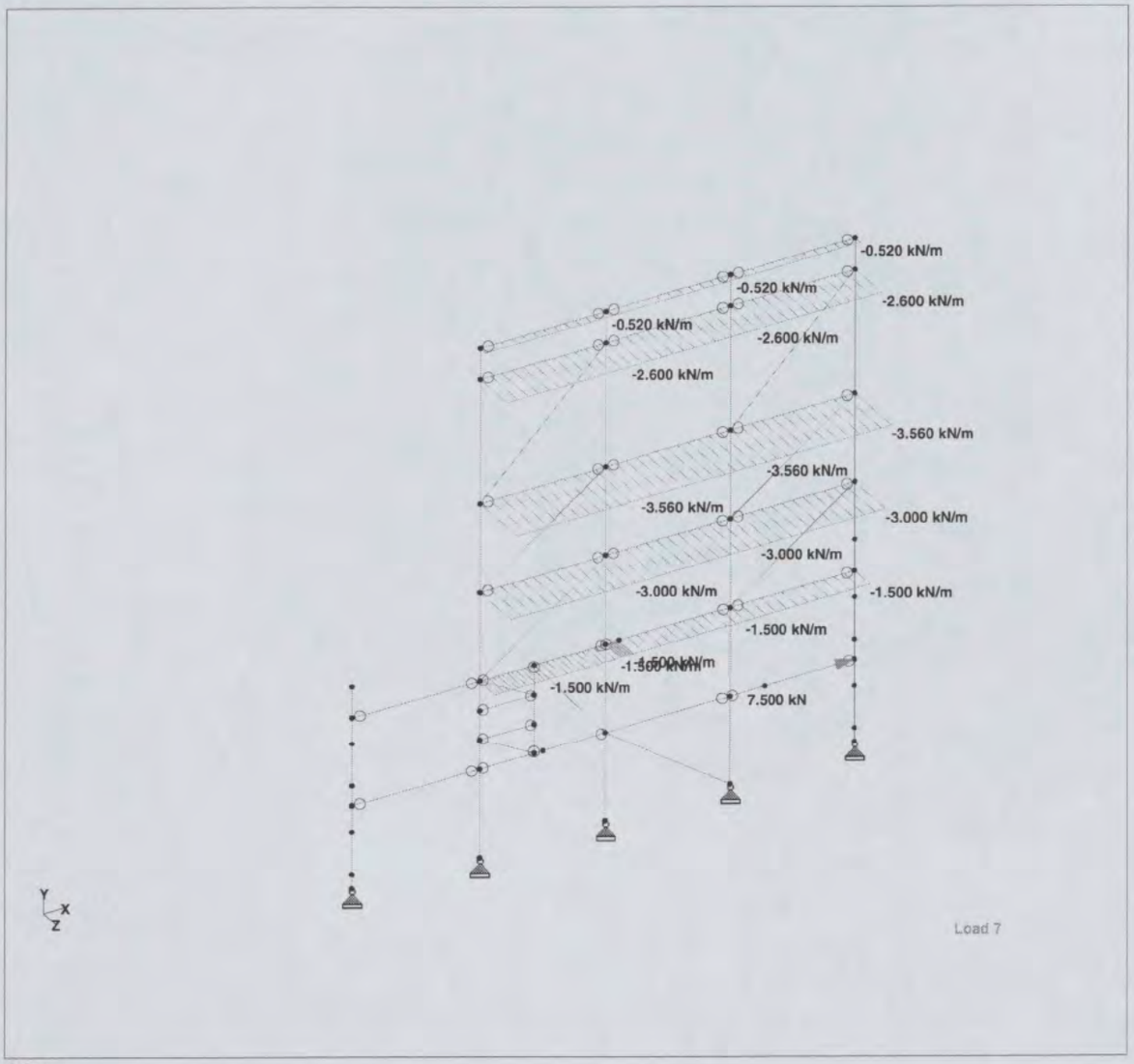
2.600 kN/m
0.520 kN/m
2.600 kN/m
0.260 kN/m
1.300 kN/m
-2.300 kN
-2.760 kN
3.560 kN/m
3.560 kN/m
1.780 kN/m
3.000 kN/m
-2.760 kN
3.000 kN/m
1.500 kN/m
1.500 kN/m
-2.760 kN
1.500 kN/m
1.500 kN/m
0.750 kN/m
-7.500 kN
0.750 kN/m
Y
X
Z
Load 5

BG 5

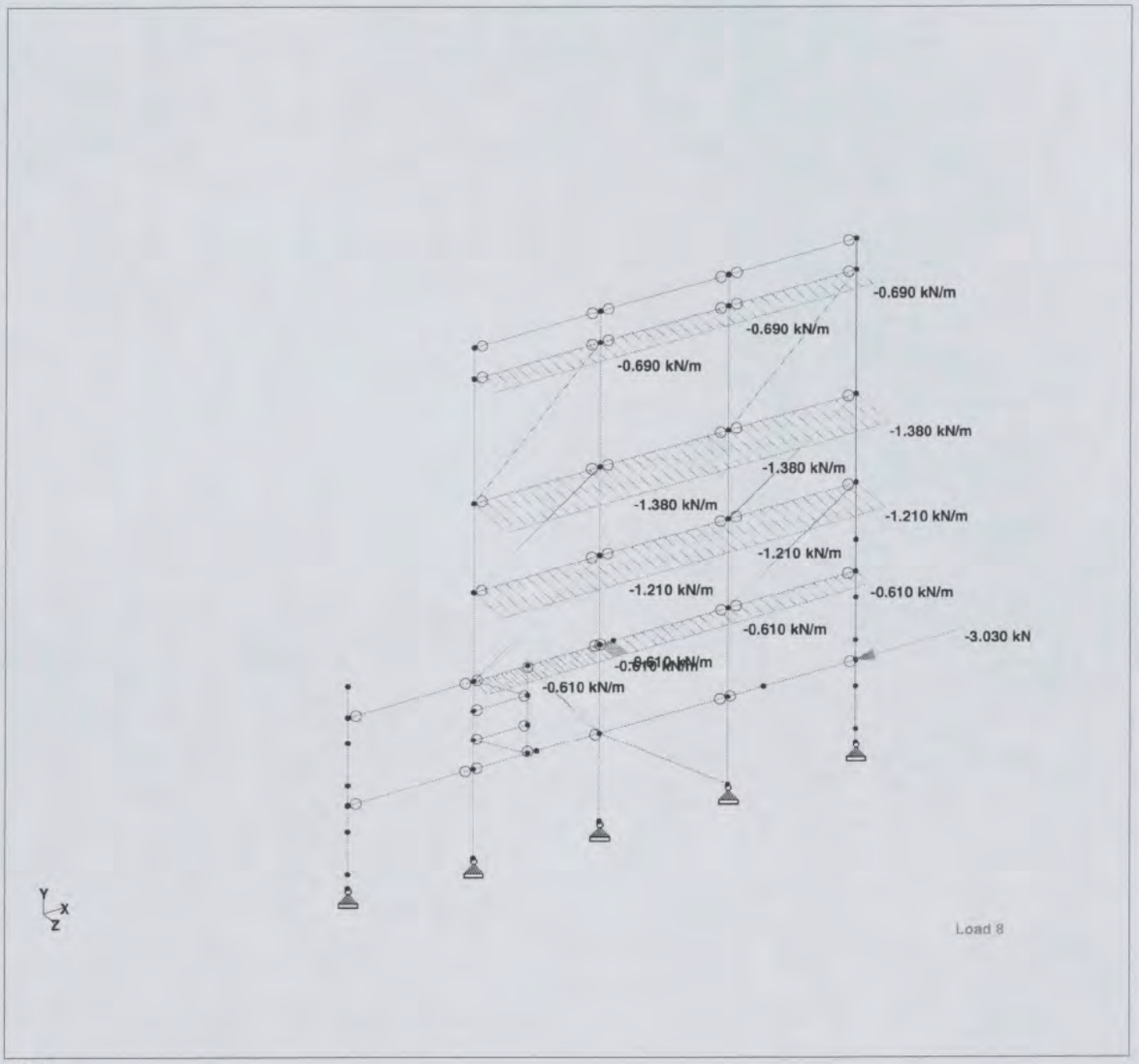

0.260 kN/m
1.300 kN/m
0.260 kN/m
1.300 kN/m
0.260 kN/m
1.300 kN/m
1.780 kN/m
1.780 kN/m
1.780 kN/m
1.500 kN/m
1.500 kN/m
1.500 kN/m
0.750 kN/m
0.750 kN/m
0.750 kN/m
0.750 kN/m
7.500 kN
Y
X
Z
Load 6

BG 6



BG 7

the scale towards document


-0.690 kN/m
-0.690 kN/m
-0.690 kN/m
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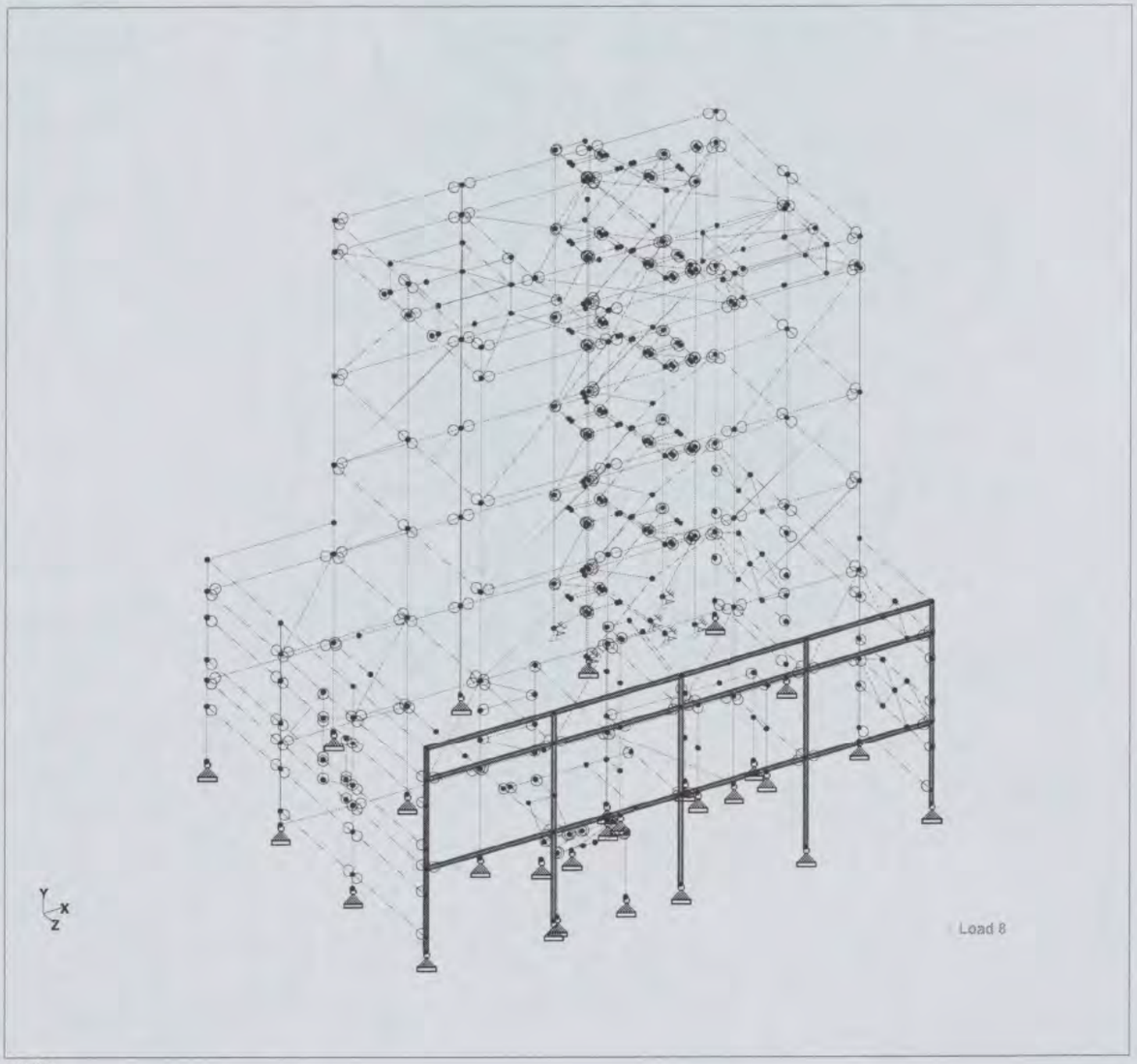
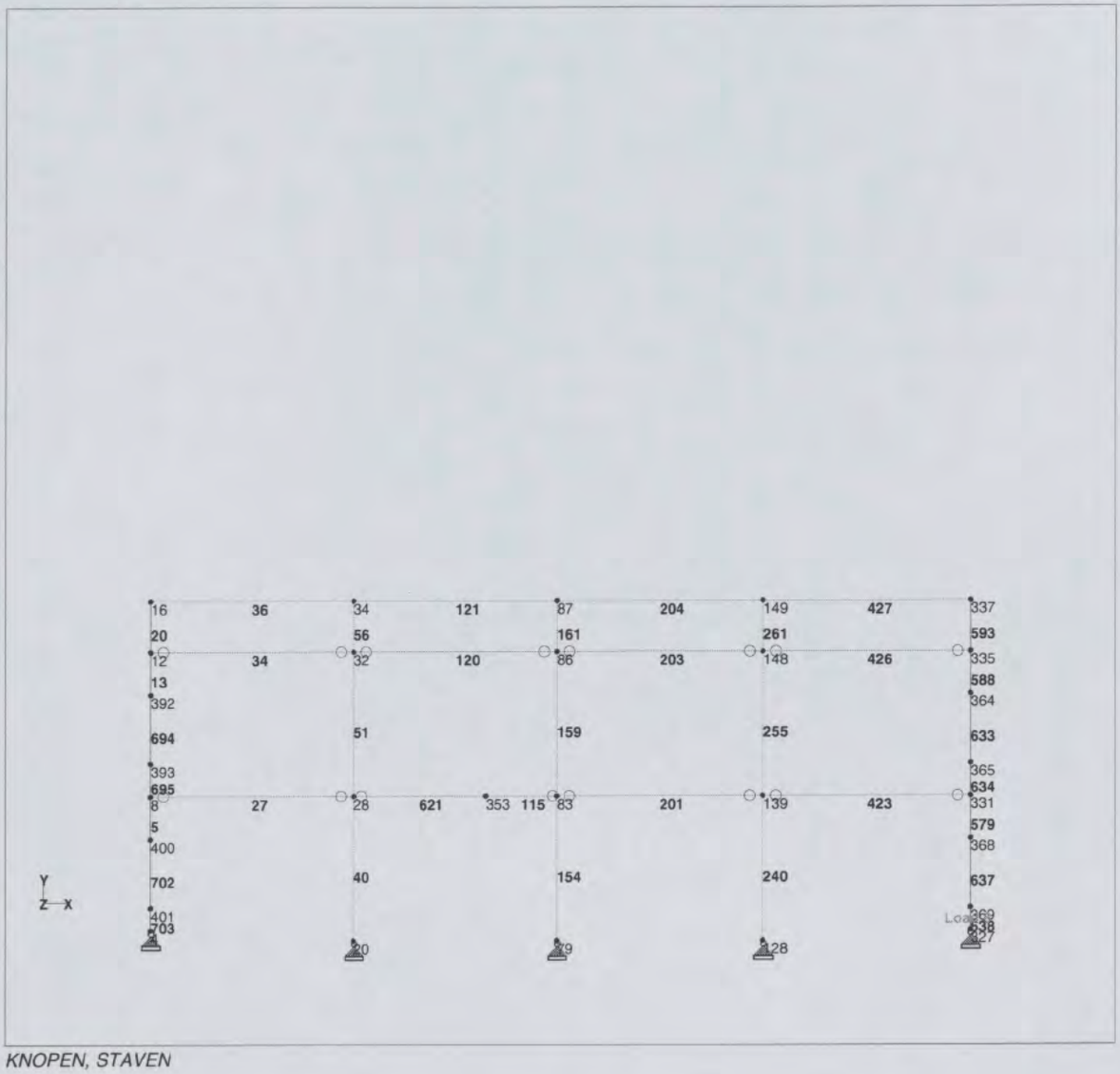
-1.380 kN/m
-1.380 kN/m
-1.210 kN/m
-1.210 kN/m
-1.210 kN/m
-0.610 kN/m
-0.610 kN/m
-3.030 kN
-0.610 kN/m
-0.610 kN/m
Y
X
Z
Load 8

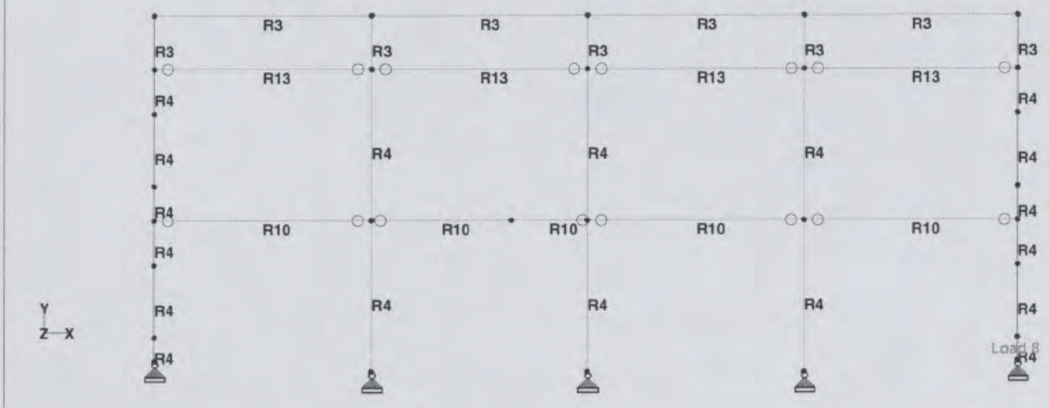
BG 8



RIJ D



KNOPEN, STAVEN



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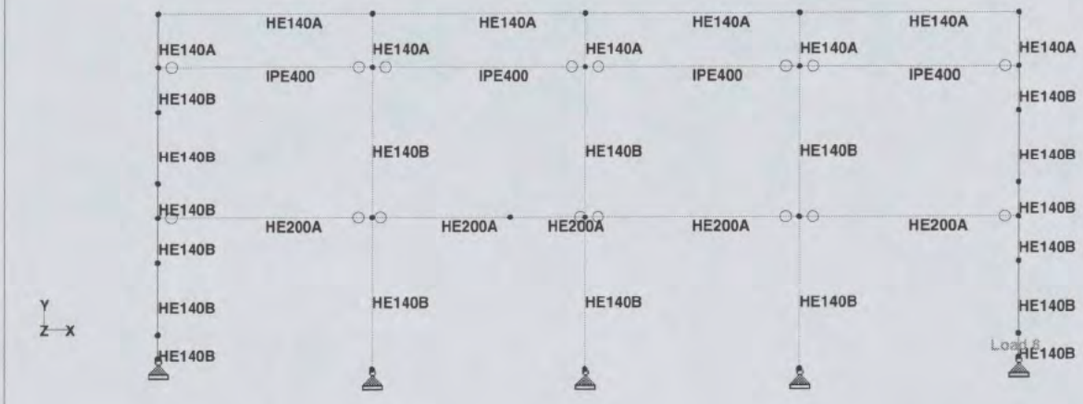
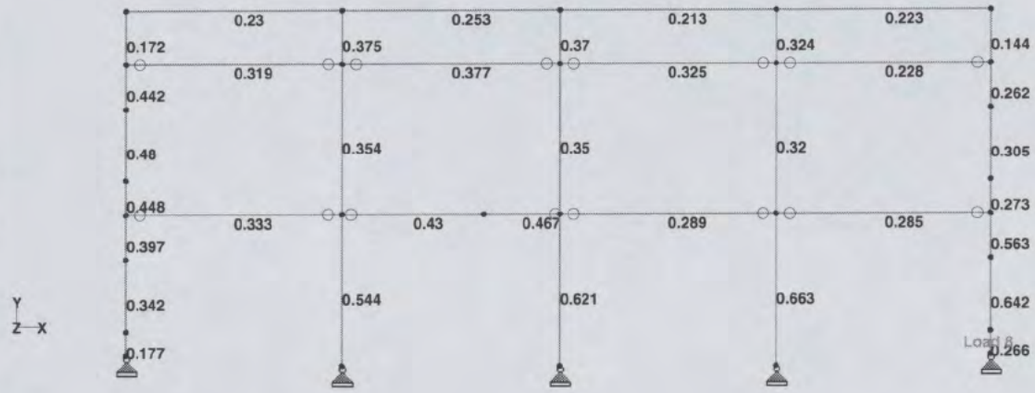
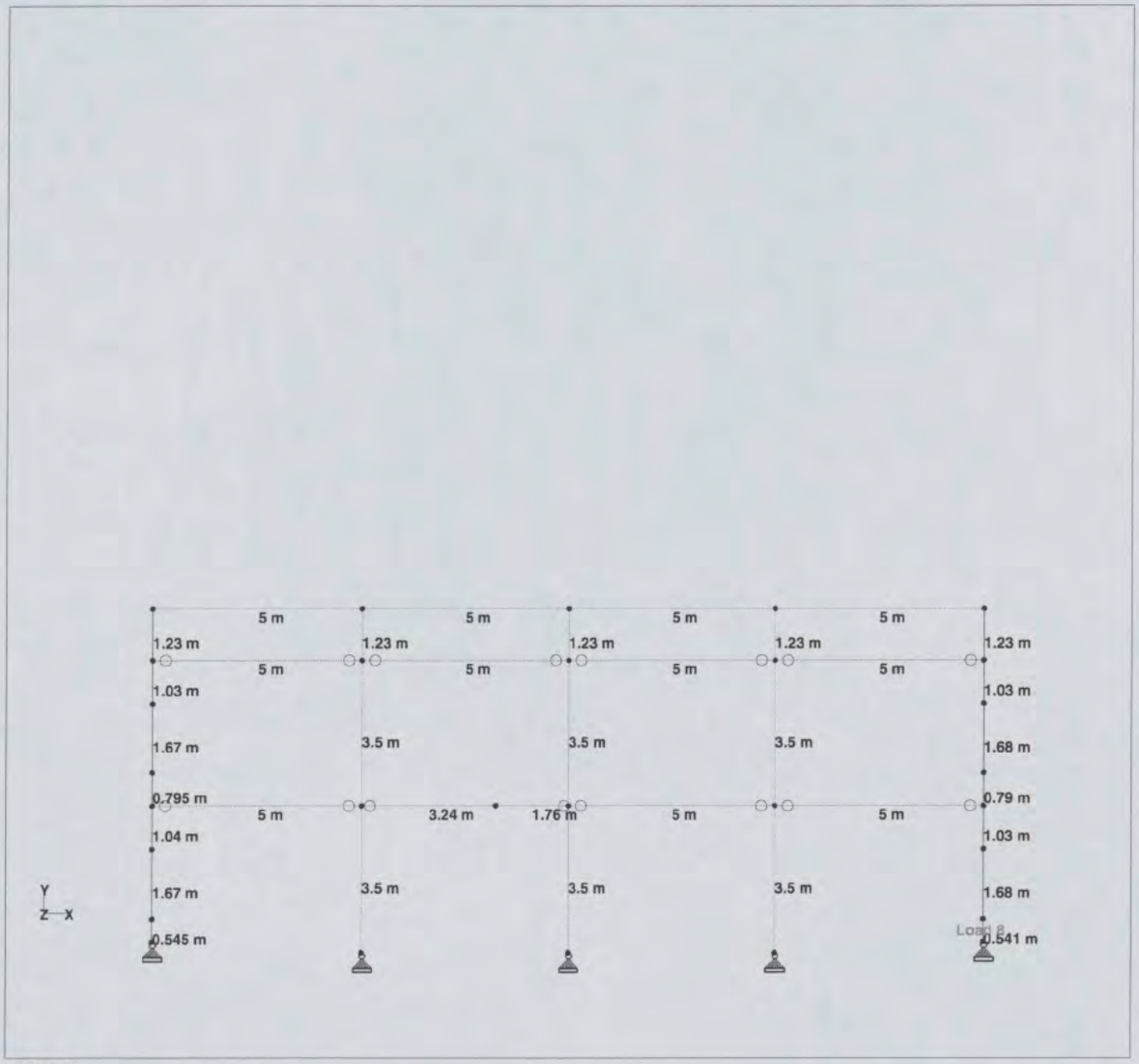


PROFIELEN

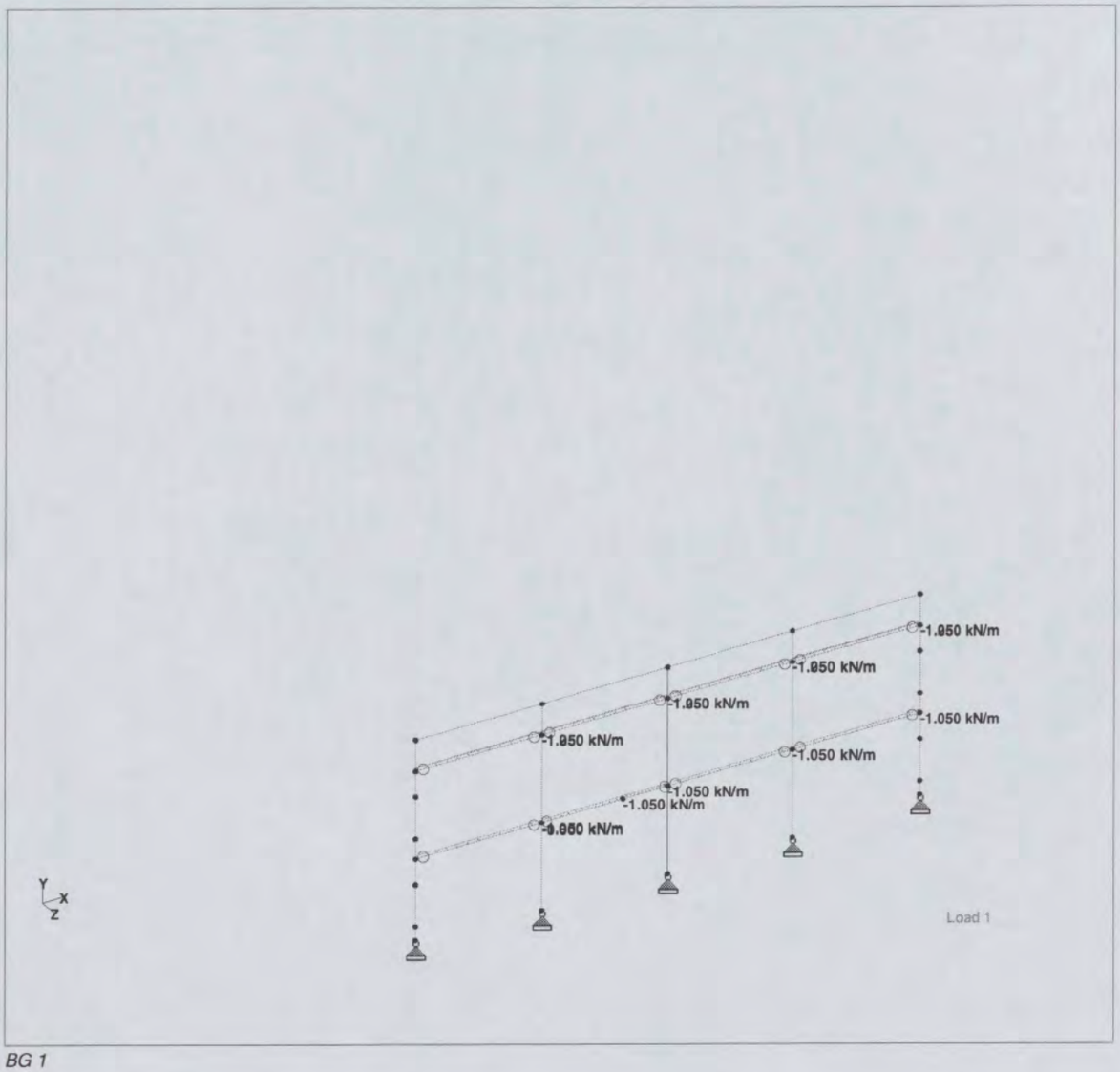


TOETSINGSFACTOREN

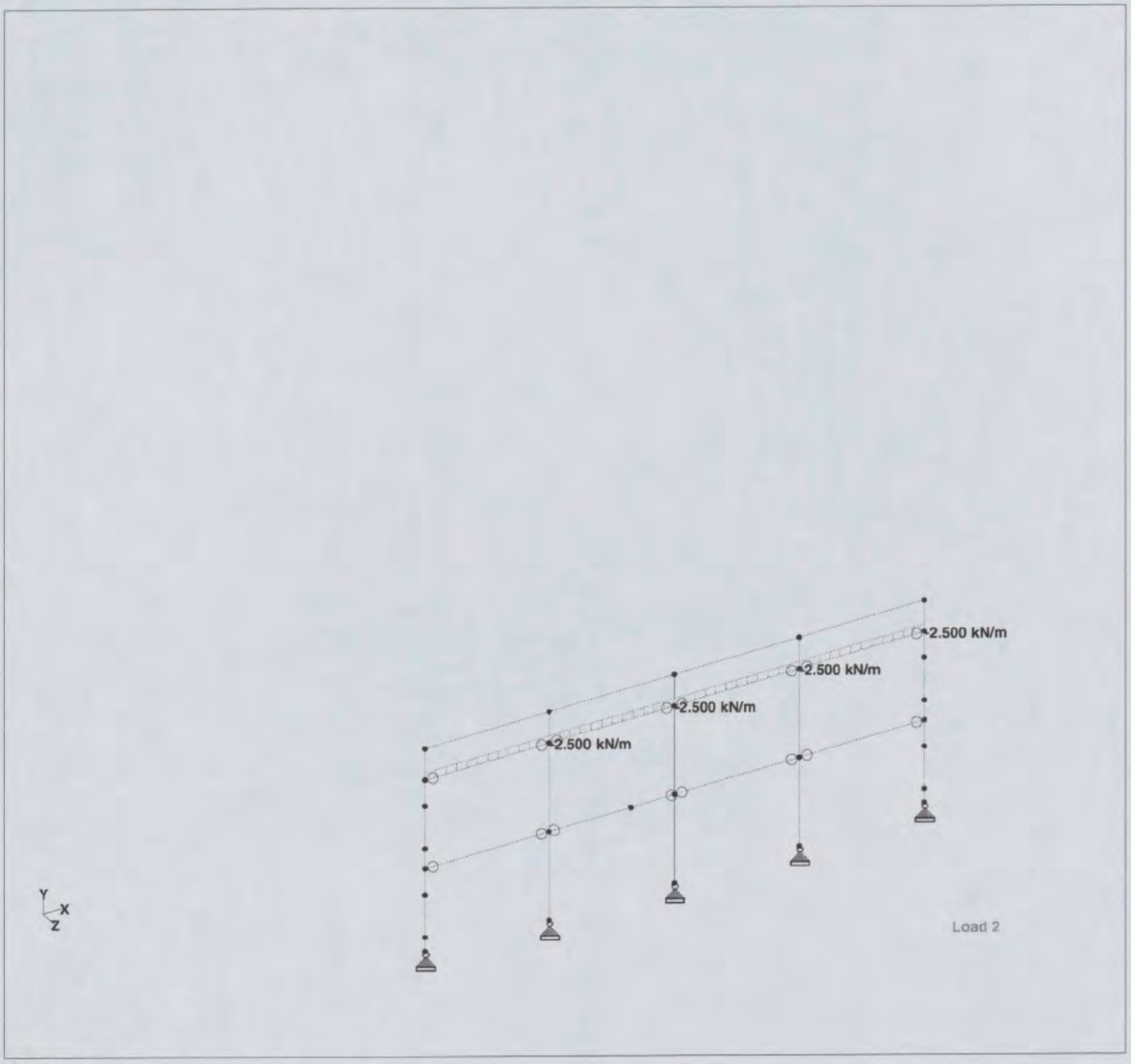


MATEN

the scale towards document

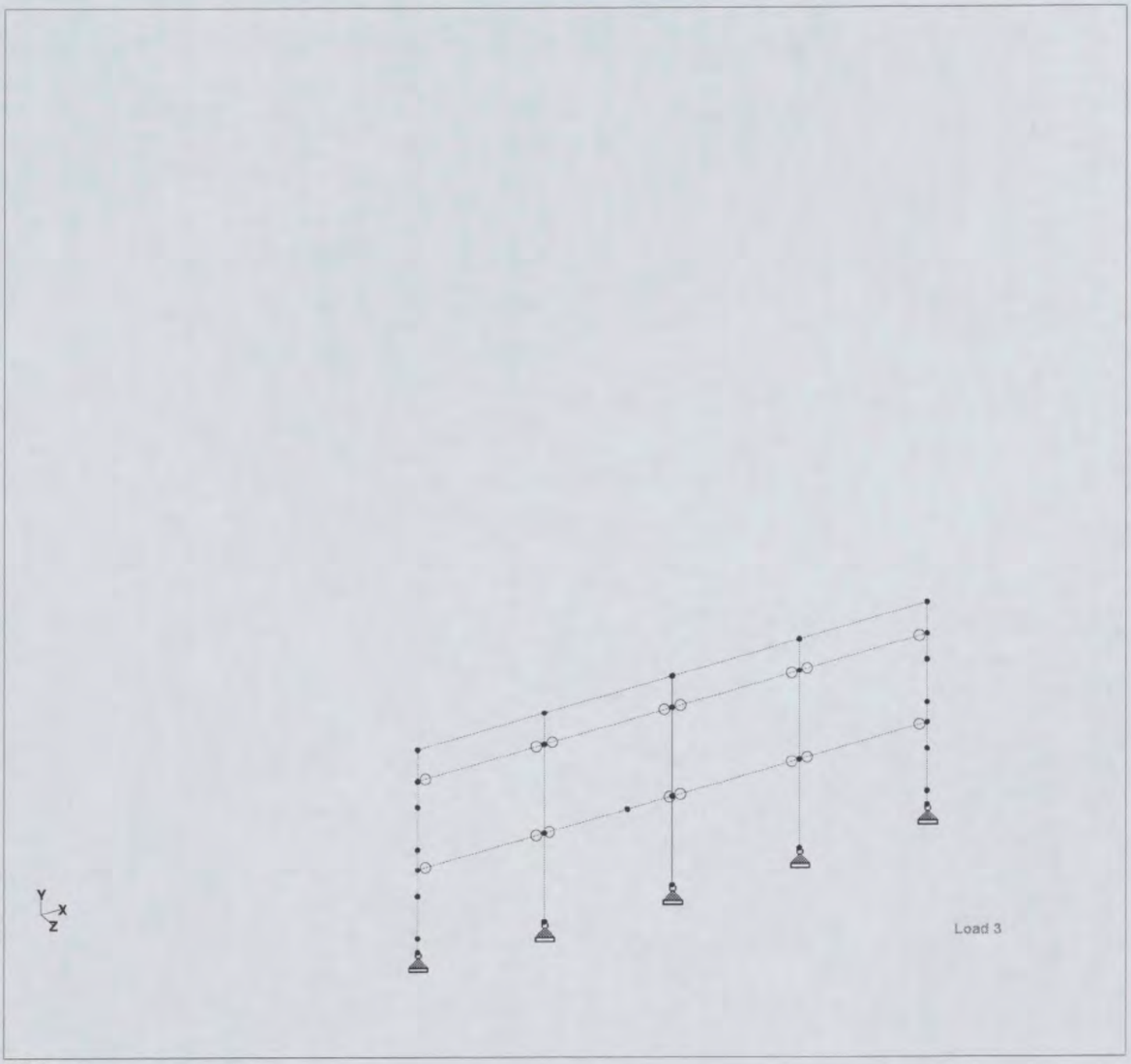

-1.050 kN/m
-1.050 kN/m
-1.050 kN/m
-1.050 kN/m
-1.050 kN/m
-1.050 kN/m
-1.050 kN/m
-1.050 kN/m
Y
X
Z
Load 1

BG 1

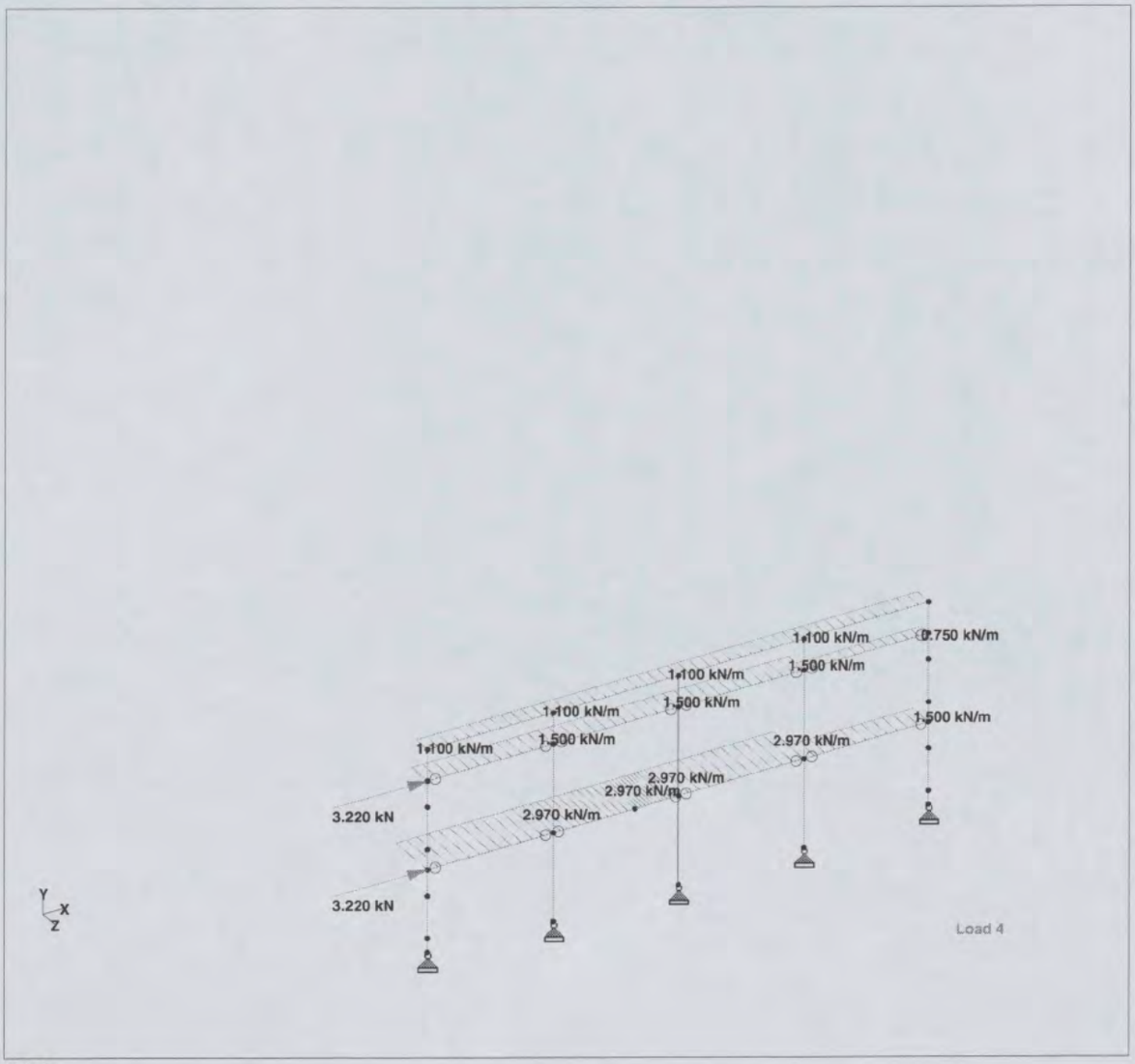


BG 2

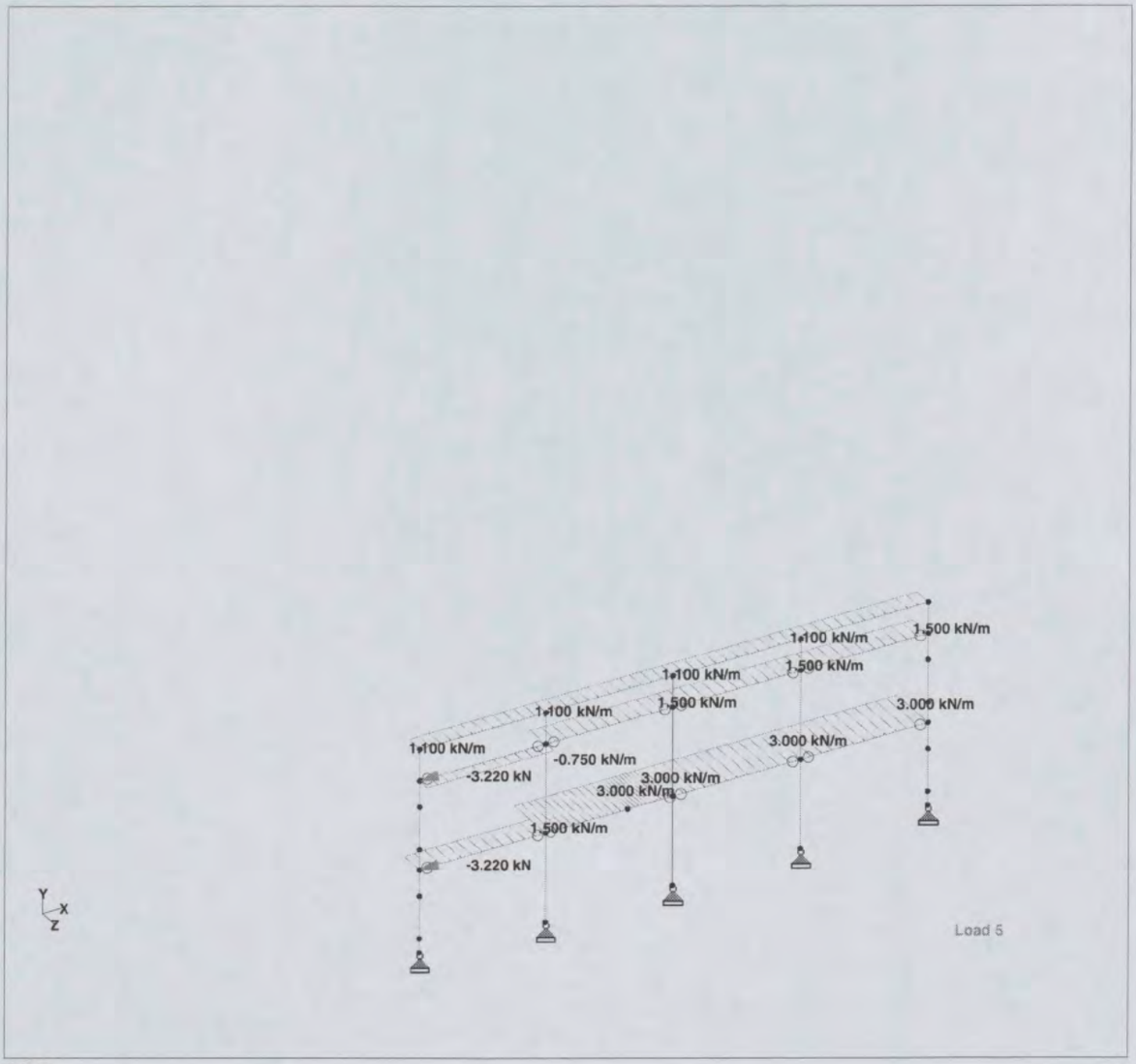
the scale towards document



BG 3


1.100 kN/m
0.750 kN/m
1.100 kN/m
1.500 kN/m
1.100 kN/m
1.500 kN/m
1.500 kN/m
1.100 kN/m
1.500 kN/m
2.970 kN/m
2.970 kN/m
2.970 kN/m
3.220 kN
2.970 kN/m
3.220 kN
Y
X
Z
Load 4

BG 4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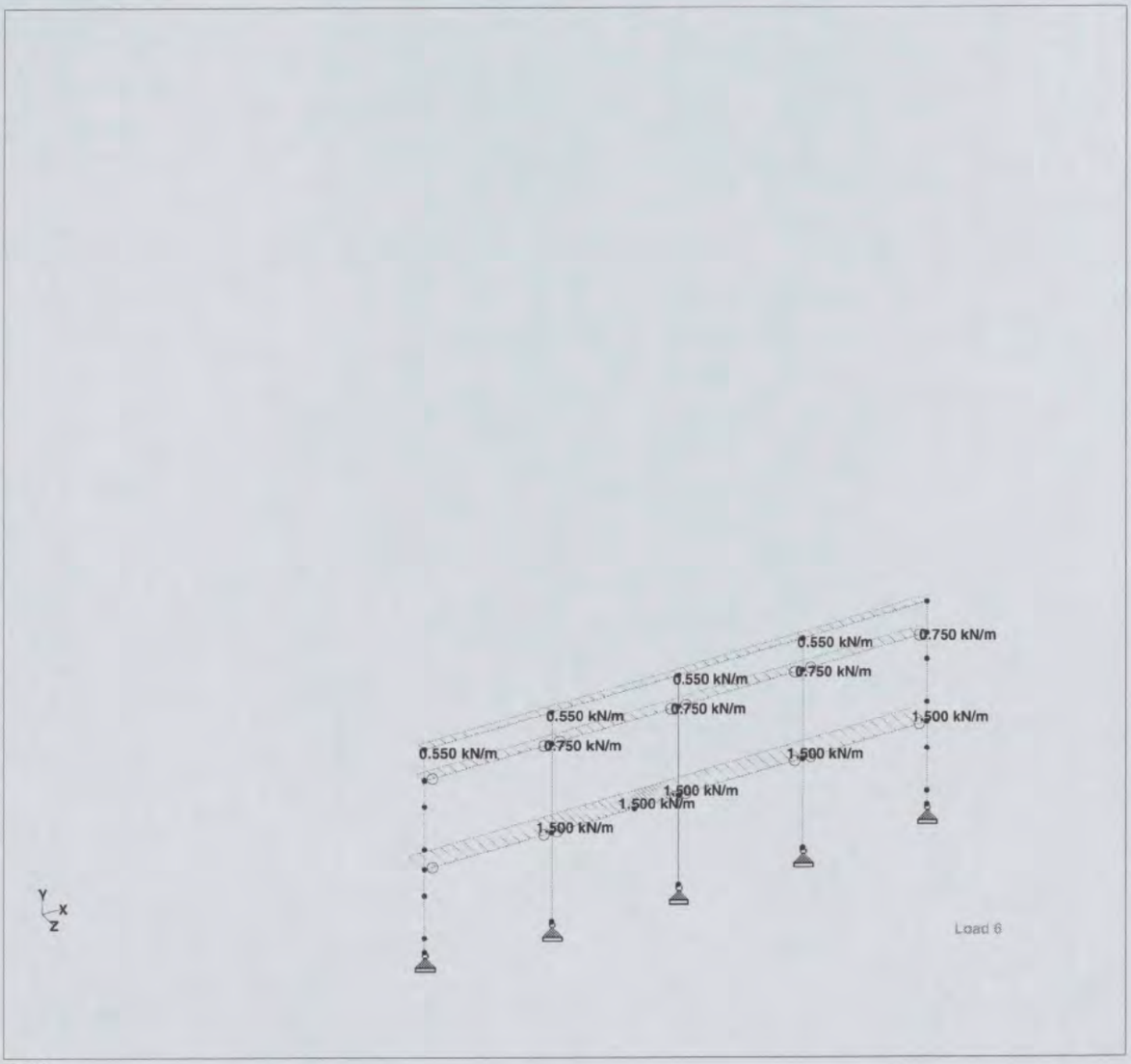
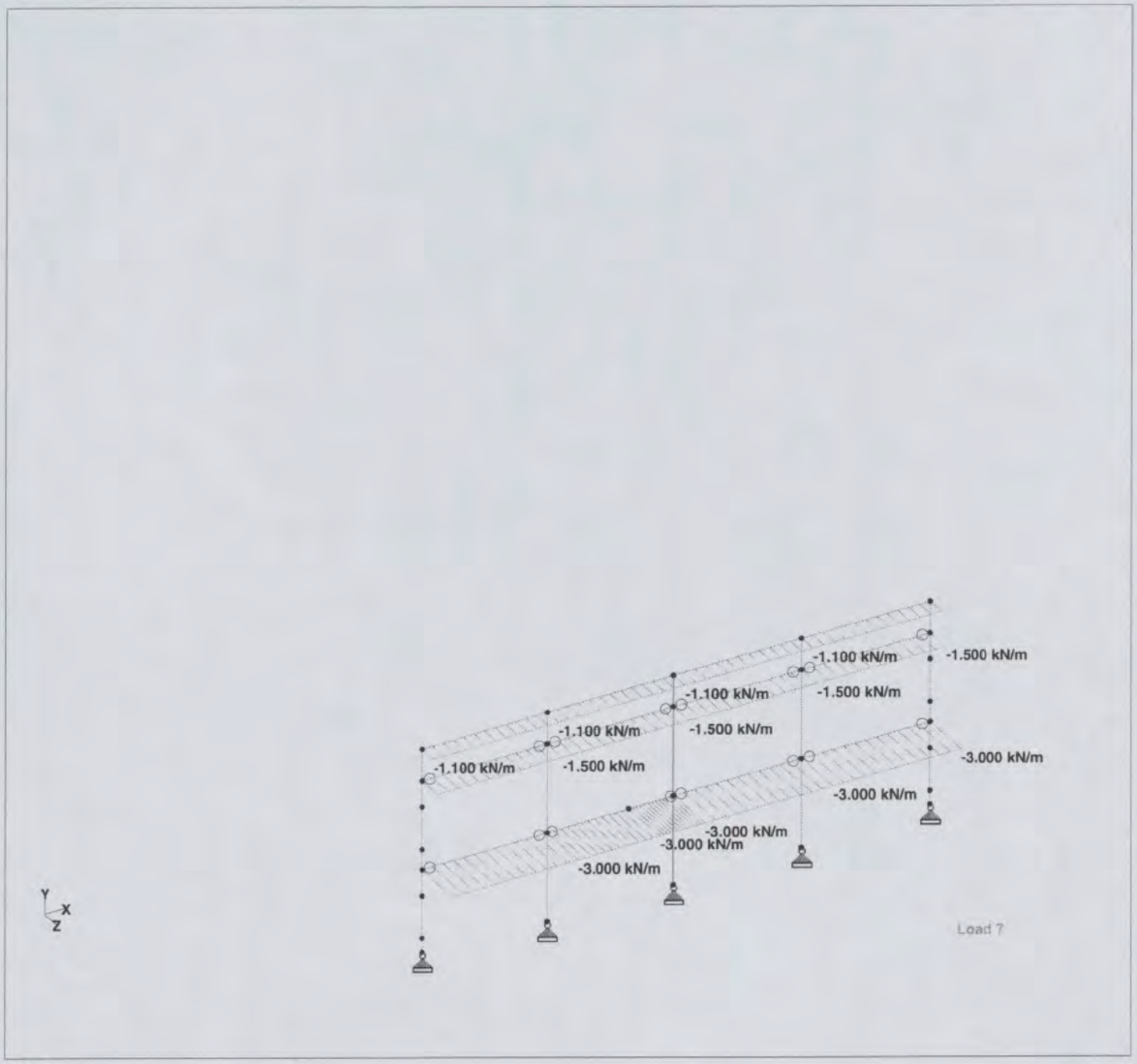
1.500 kN/m
1.100 kN/m
1.500 kN/m
1.100 kN/m
1.500 kN/m
3.000 kN/m
1.100 kN/m
-0.750 kN/m
-3.220 kN
3.000 kN/m
3.000 kN/m
3.000 kN/m
1.500 kN/m
-3.220 kN
Y
X
Z
Load 5

BG 5


0.550 kN/m
0.750 kN/m
0.550 kN/m
0.750 kN/m
0.550 kN/m
0.750 kN/m
0.550 kN/m
0.750 kN/m
1.500 kN/m
1.500 kN/m
1.500 kN/m
1.500 kN/m
1.500 kN/m
Y
X
Z
Load 6

BG 6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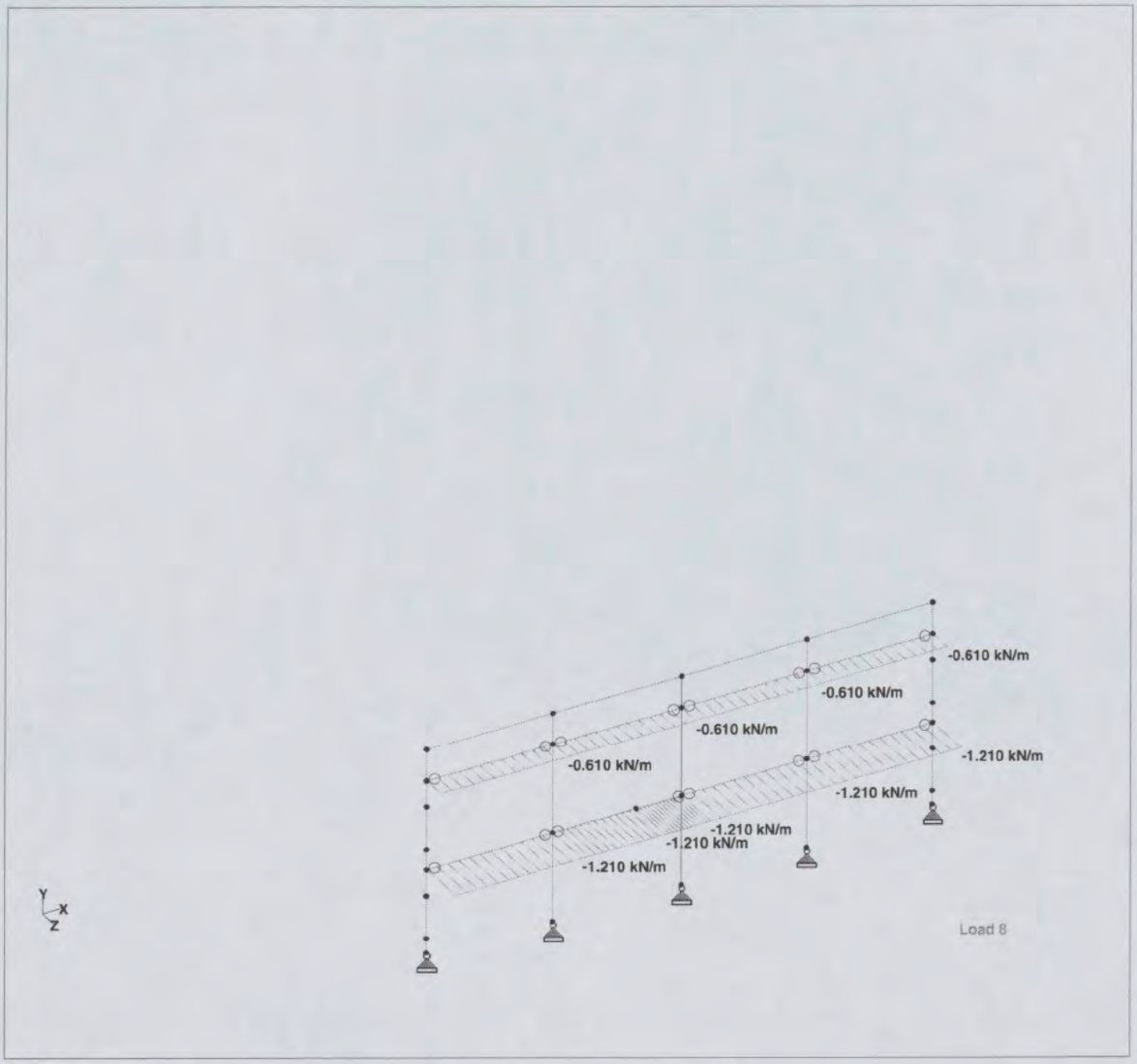
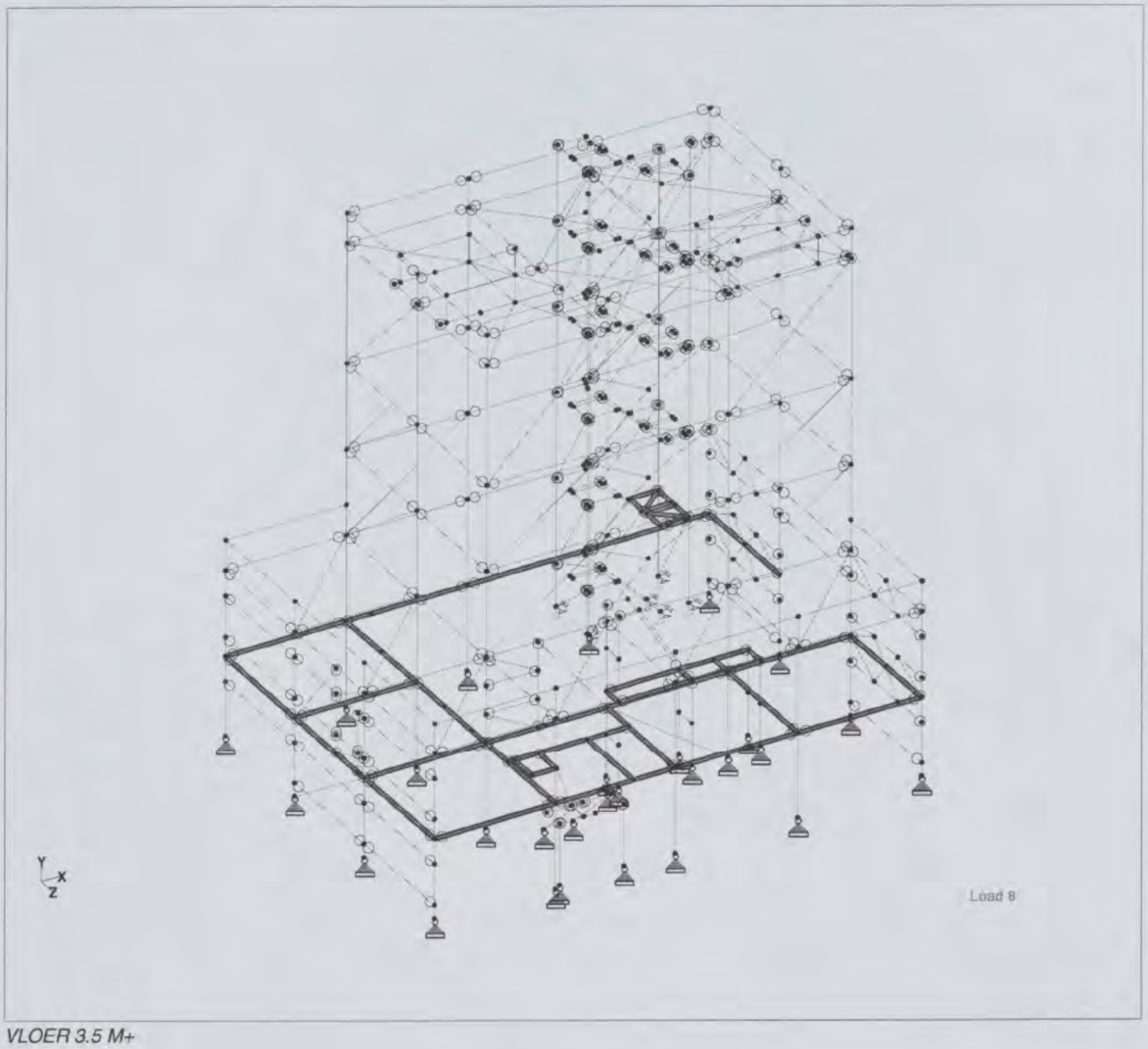
-1.500 kN/m
-1.100 kN/m
-1.500 kN/m
-1.100 kN/m
-1.500 kN/m
-1.100 kN/m
-1.500 kN/m
-3.000 kN/m
-3.000 kN/m
-3.000 kN/m
-3.000 kN/m
-3.000 kN/m
Y
X
Z
Load 7

BG 7

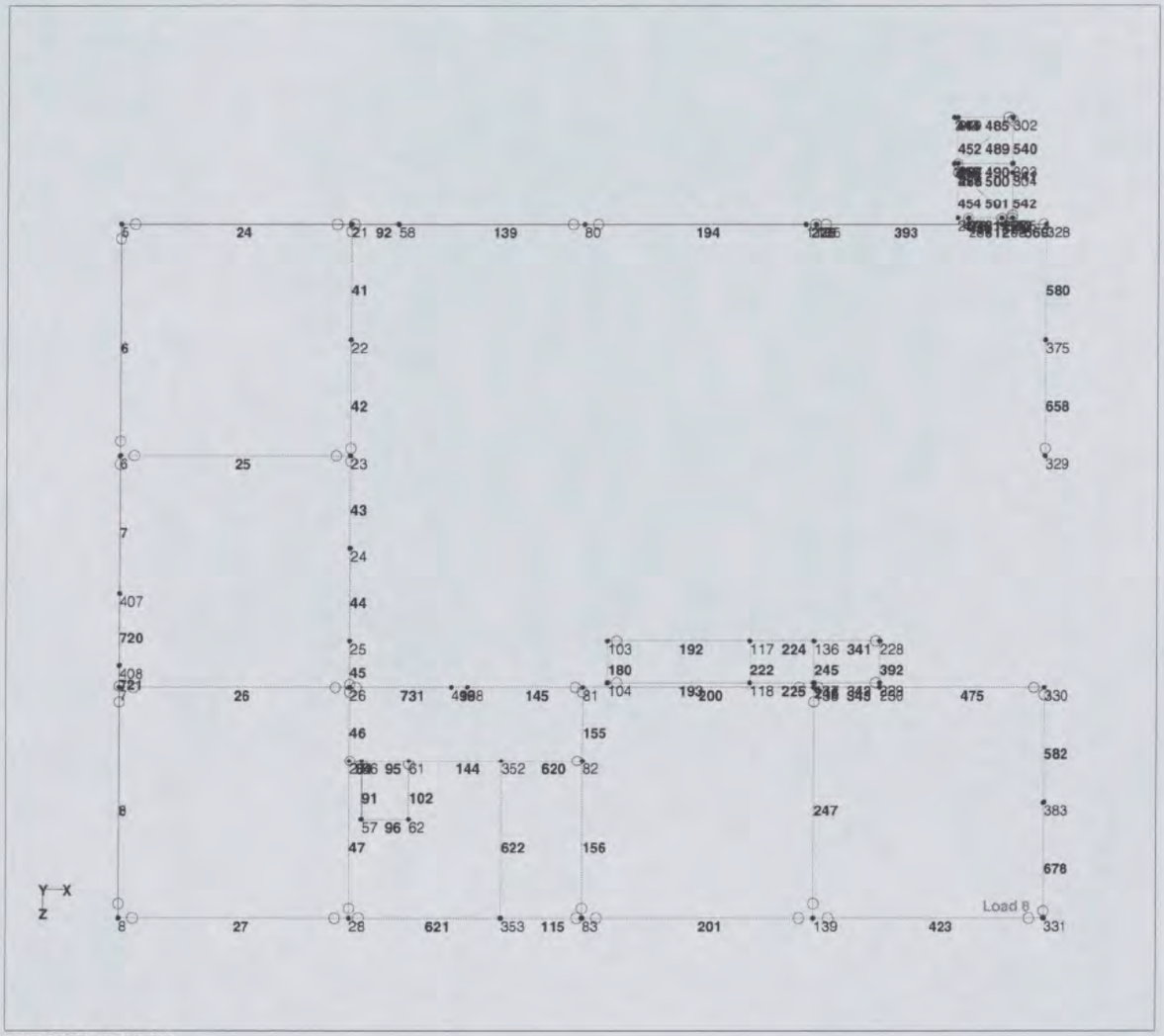


BG 8

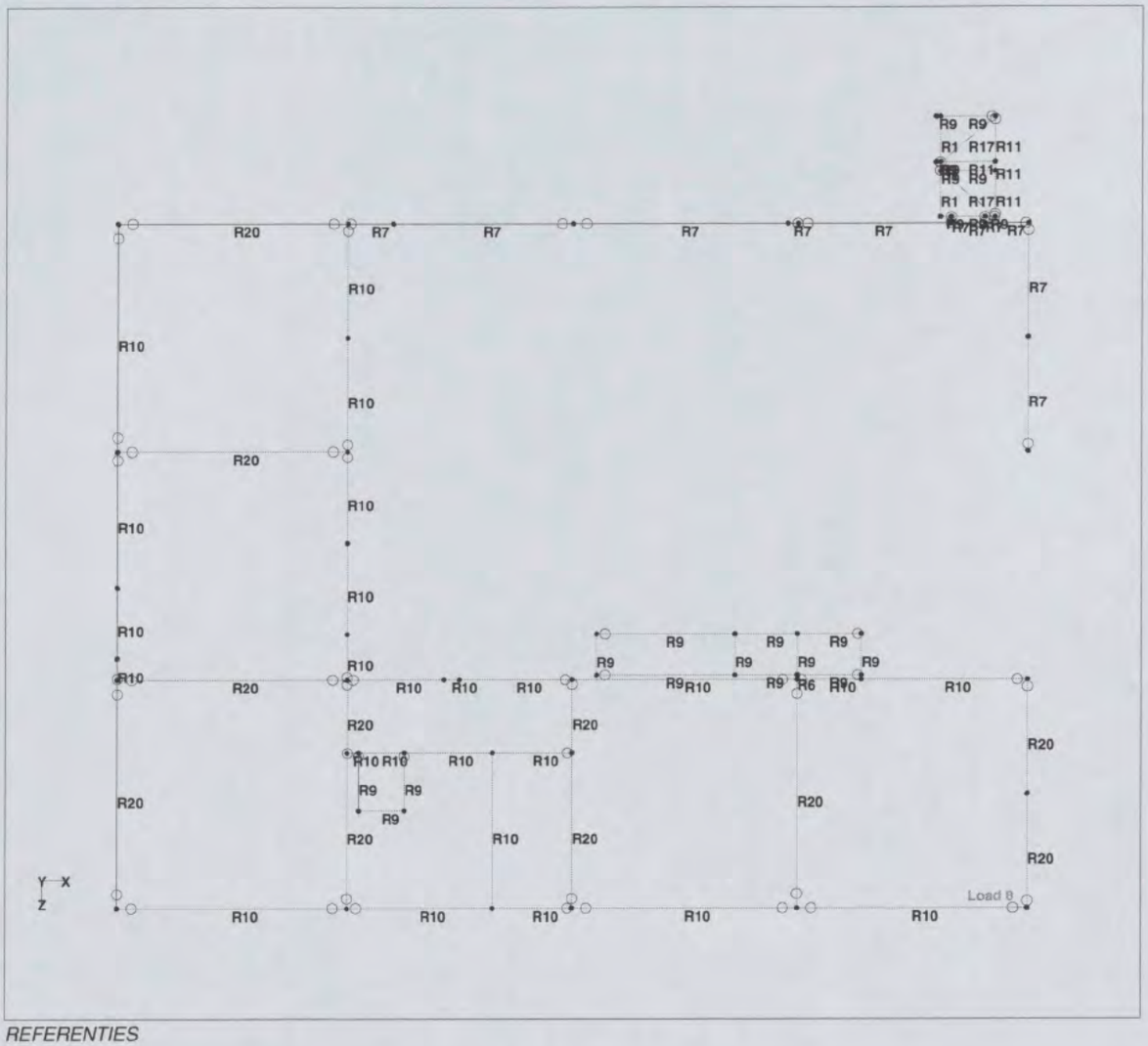
the scale towards document



VLOER 3.5 M+



KNOPEN, STAVEN



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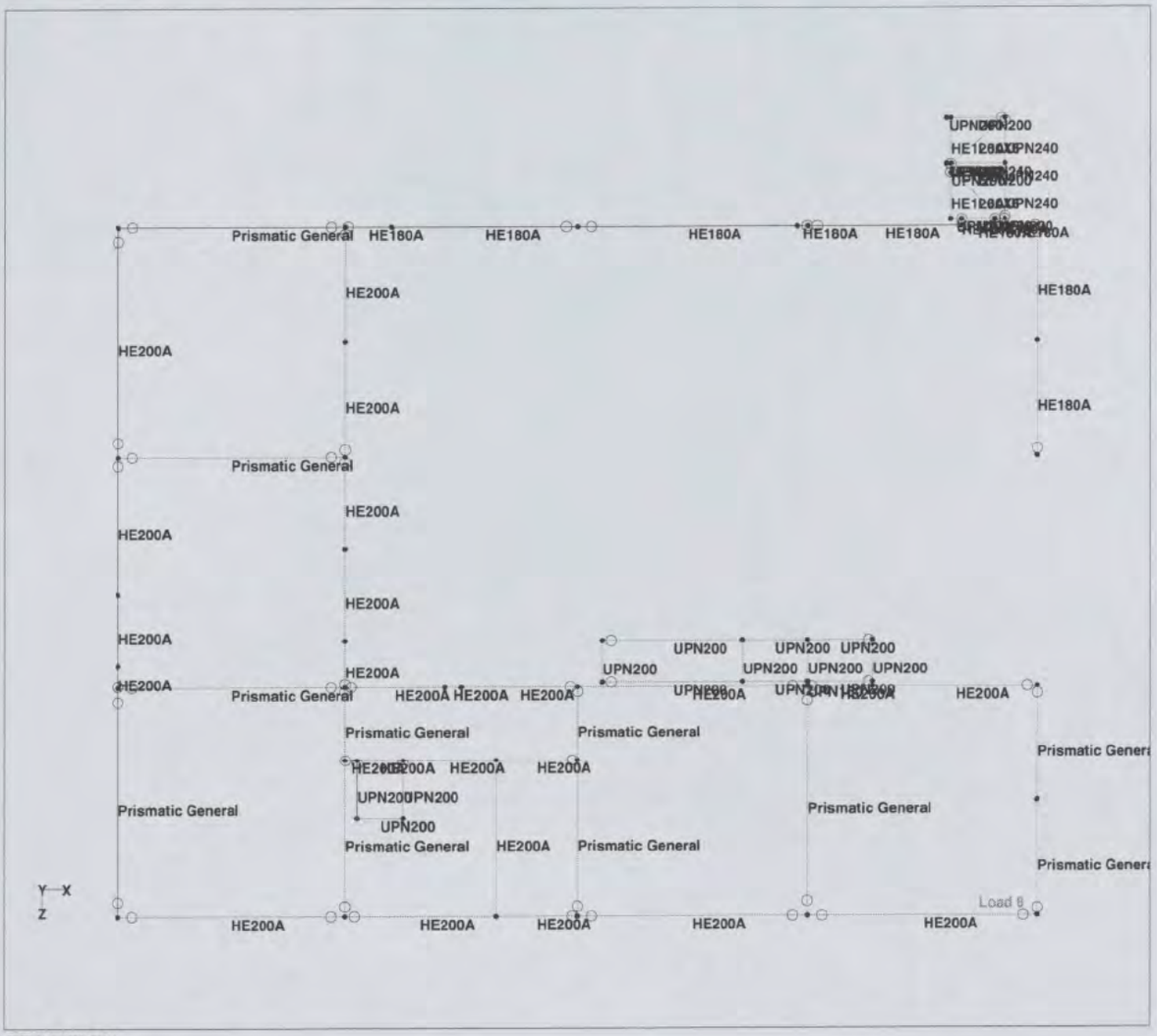
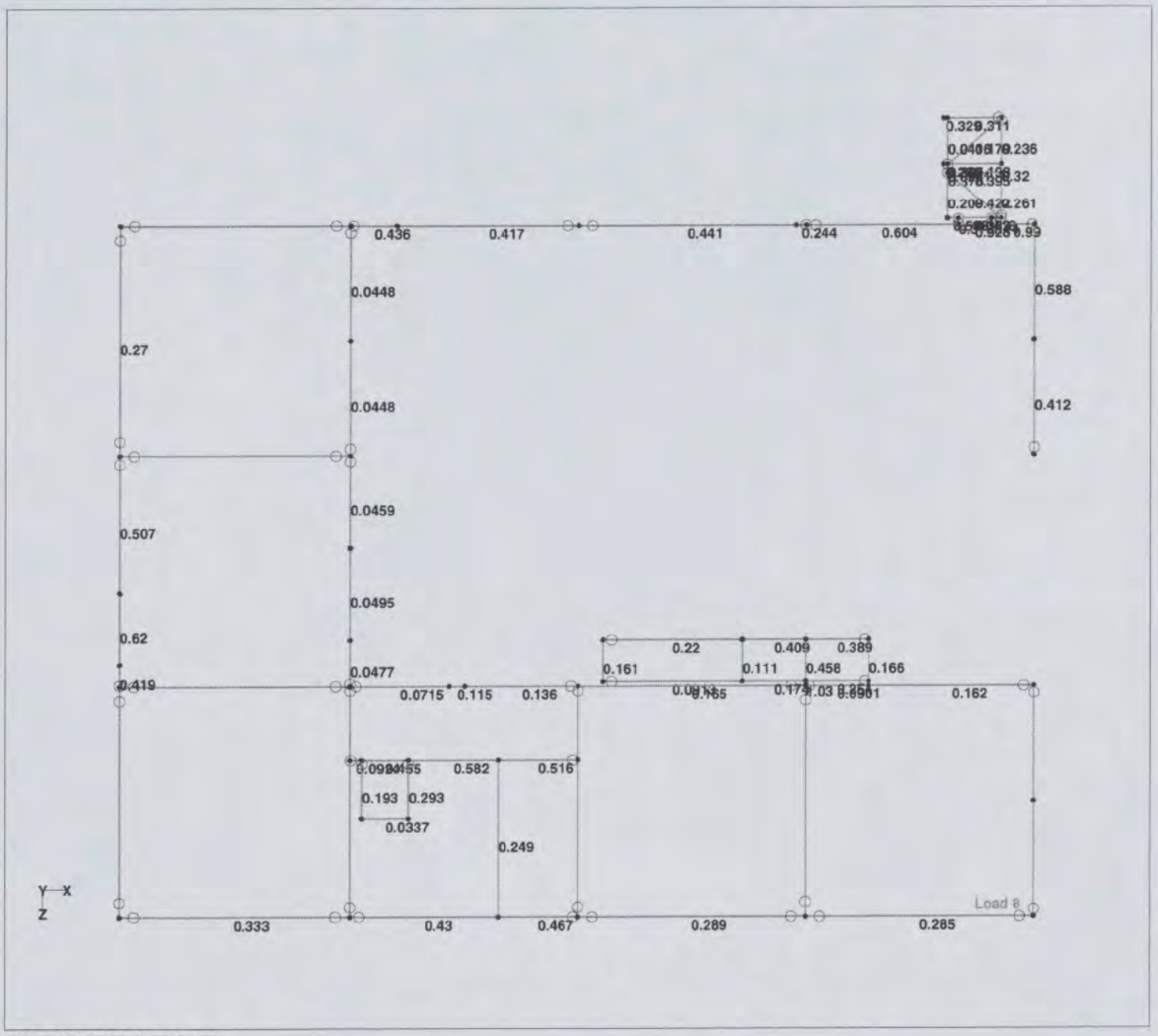
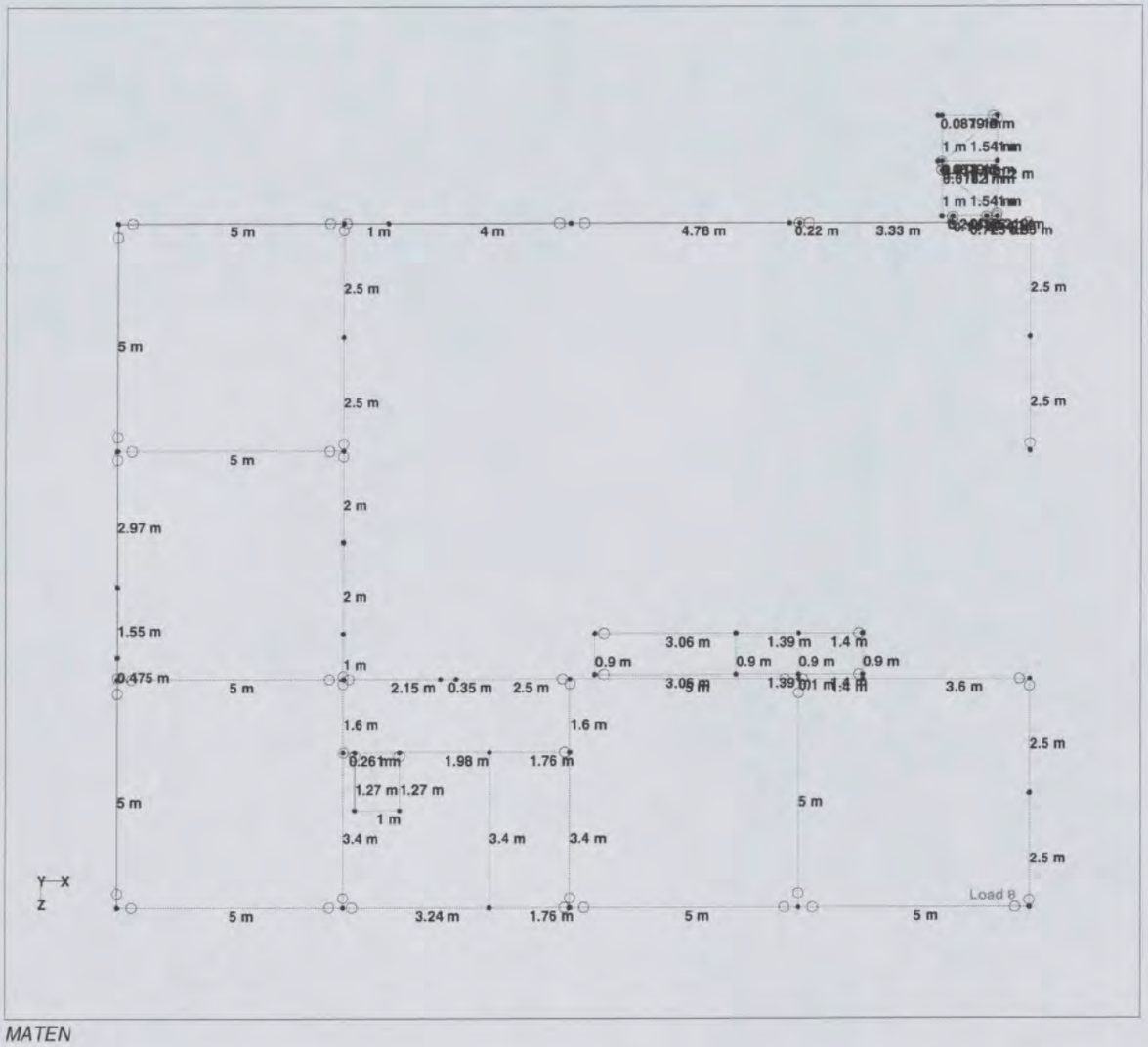


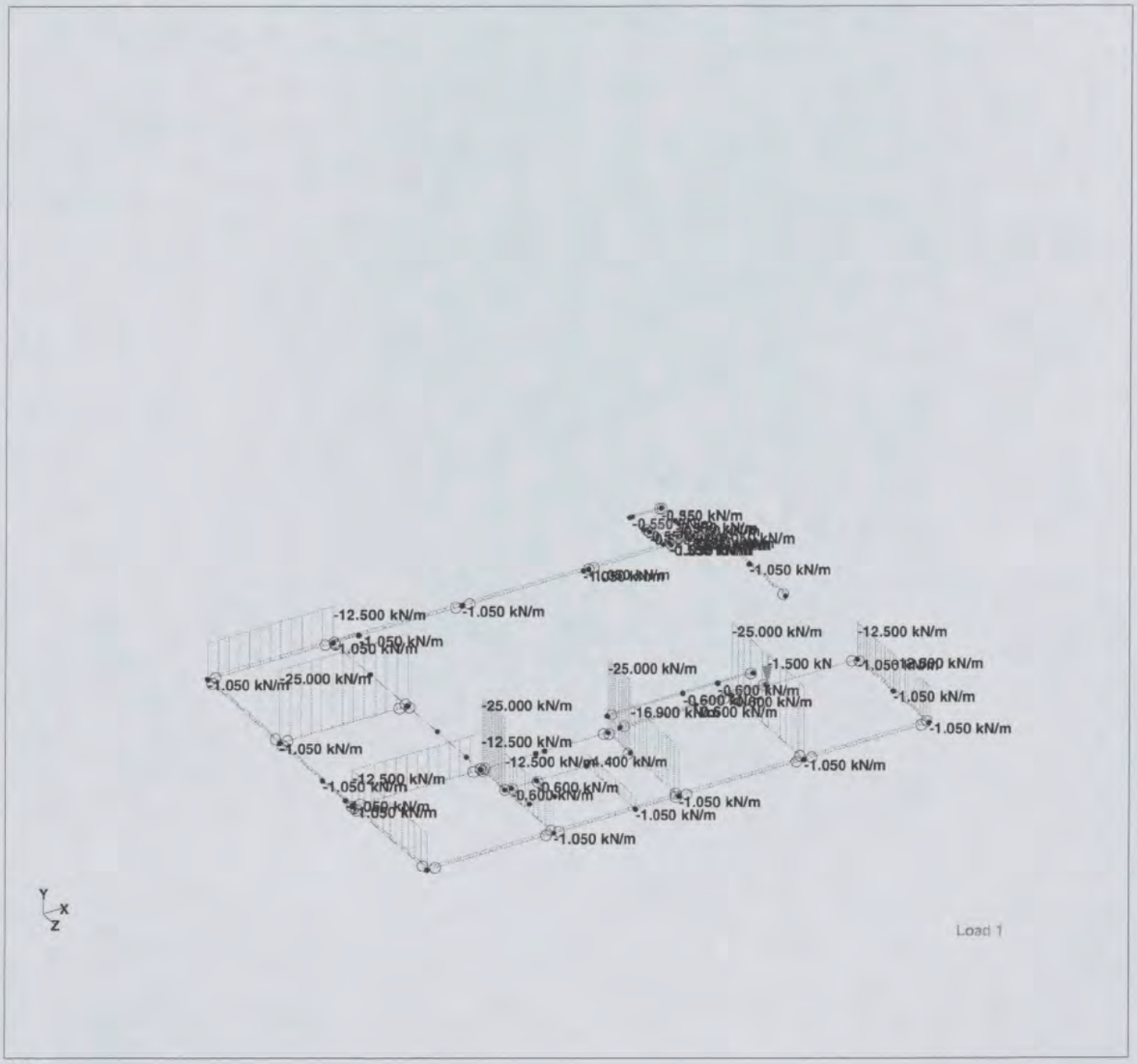
PROFIELEN



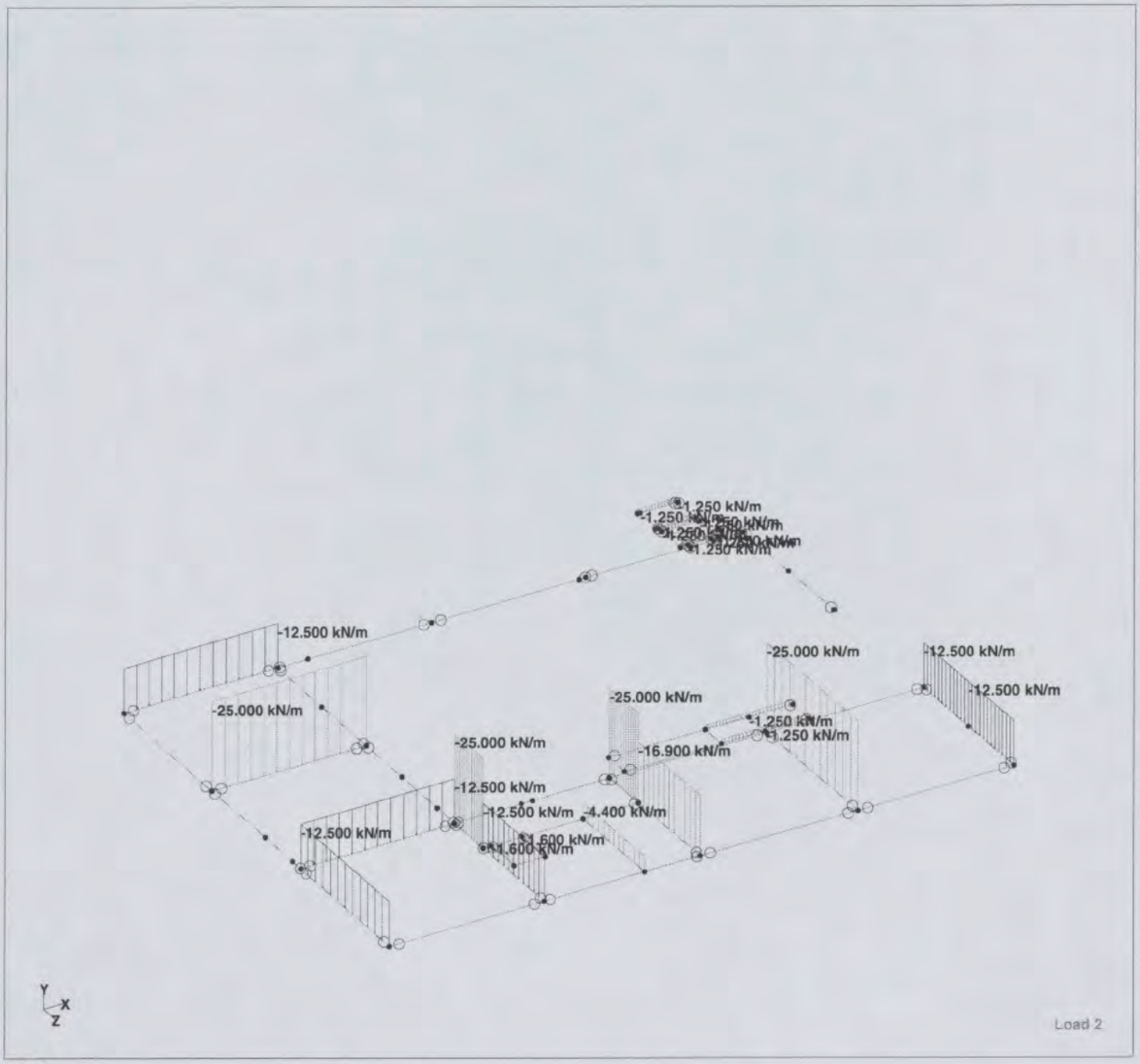
TOETSINGSFACTOREN


5 m
1 m
4 m
4.78 m
0.22 m
3.33 m
2.5 m
5 m
2 m
2.97 m
1.55 m
0.475 m
2.15 m
0.35 m
3.06 m
1.39 m
1.4 m
0.9 m
3.6 m
1.6 m
0.261 m
1.98 m
1.76 m
1.27 m
3.4 m
3.24 m
Load 8
Y
X
Z

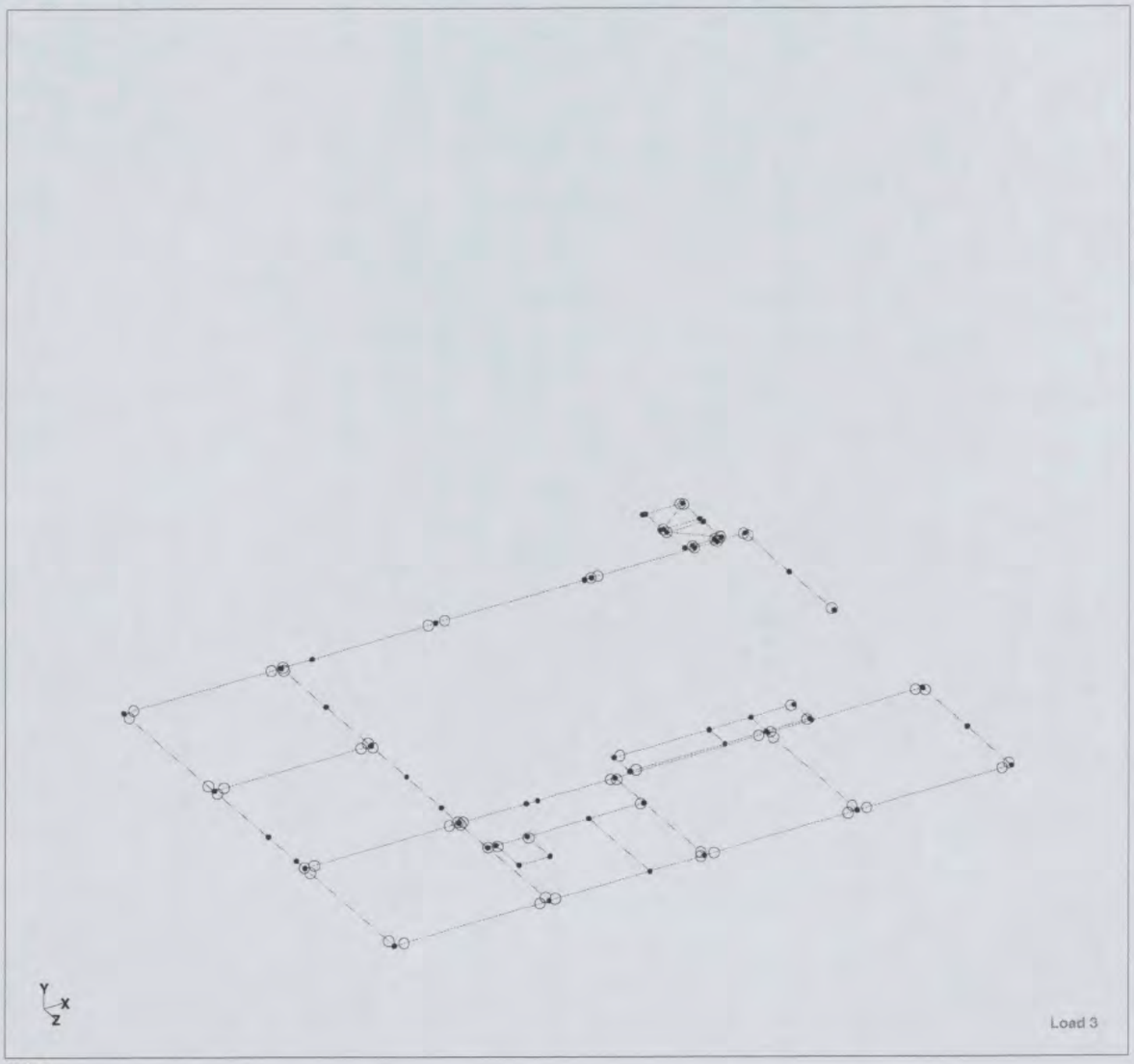
MATEN


-0.850 kN/m
-1.050 kN/m
-12.500 kN/m
-1.050 kN/m
-1.050 kN/m
-25.000 kN/m
-12.500 kN/m
-1.050 kN/m
-25.000 kN/m
-1.500 kN
-1.050 kN/m
-25.000 kN/m
-0.600 kN/m
-1.050 kN/m
-25.000 kN/m
-16.900 kN/m
-1.050 kN/m
-1.050 kN/m
-12.500 kN/m
-12.500 kN/m
-1.400 kN/m
-1.050 kN/m
-12.500 kN/m
-1.050 kN/m
-0.600 kN/m
-1.050 kN/m
-1.050 kN/m
-1.050 kN/m
Y
X
Z
Load 1

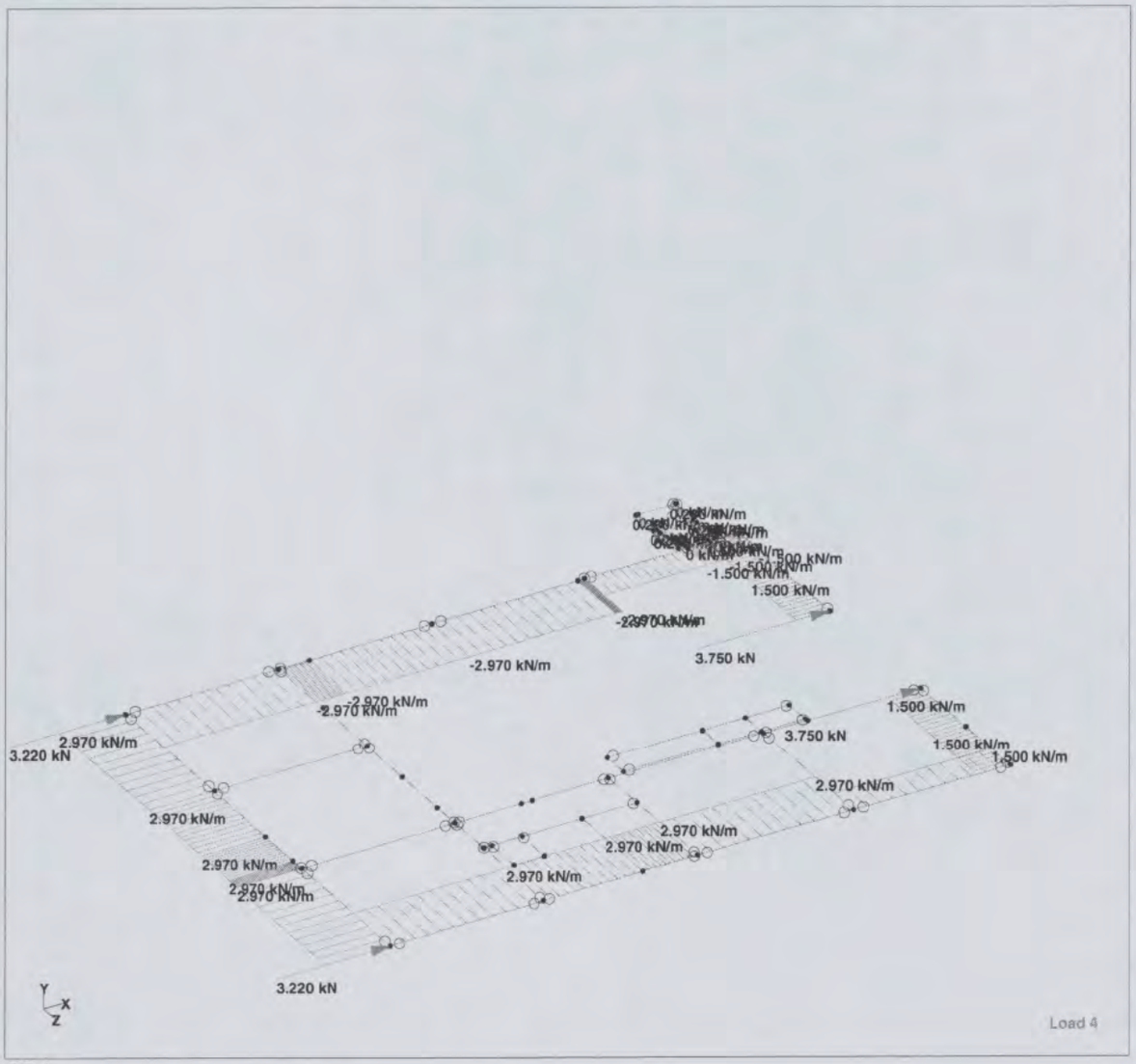
BG 1


1.250 kN/m
-12.500 kN/m
-25.000 kN/m
-25.000 kN/m
-25.000 kN/m
-25.000 kN/m
-12.500 kN/m
-16.900 kN/m
-12.500 kN/m
-12.500 kN/m
-4.400 kN/m
-12.500 kN/m
-1.600 kN/m
-1.600 kN/m
-12.500 kN/m
-12.500 kN/m
Y
X
Z
Load 2

BG 2

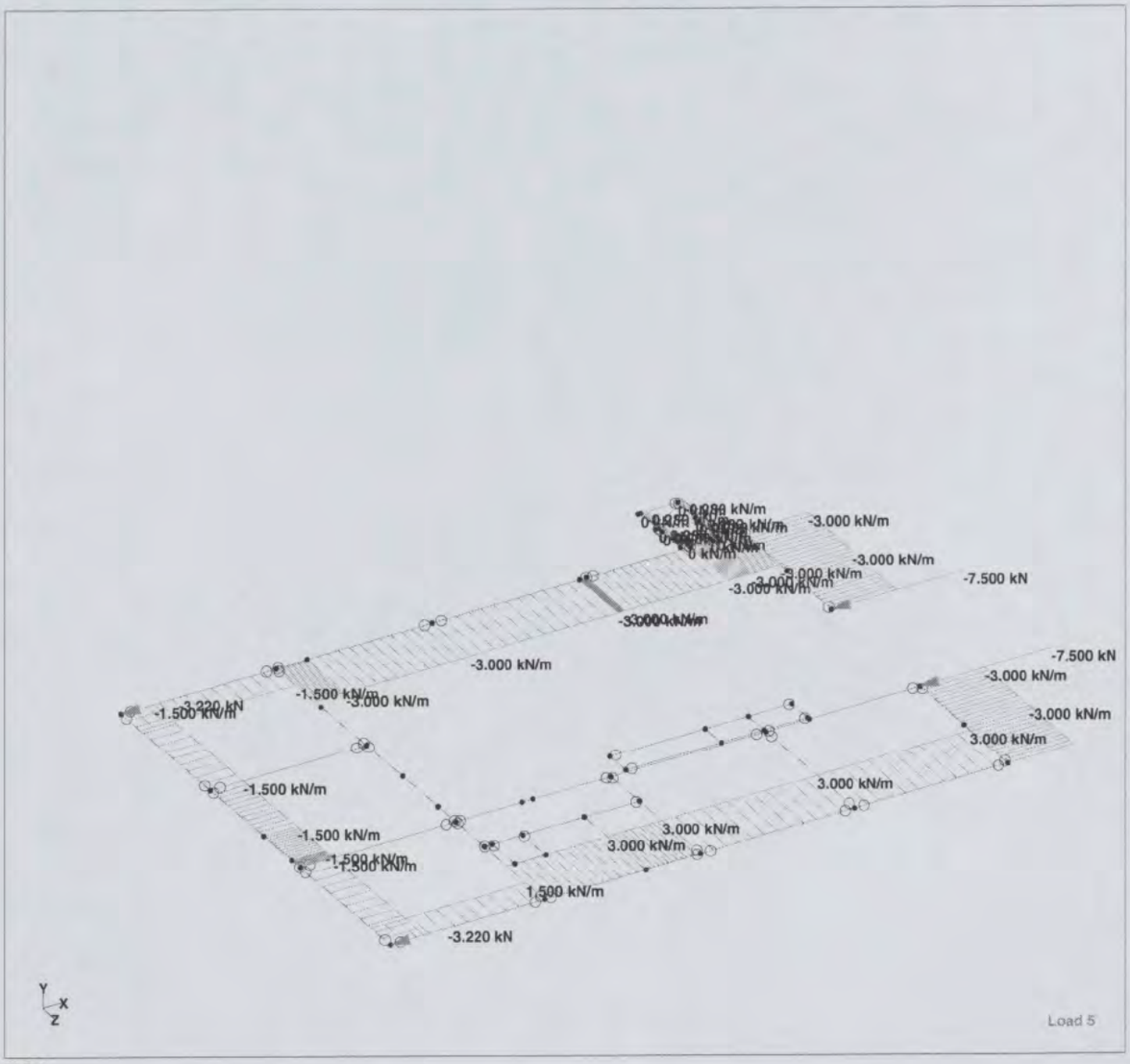


BG 3



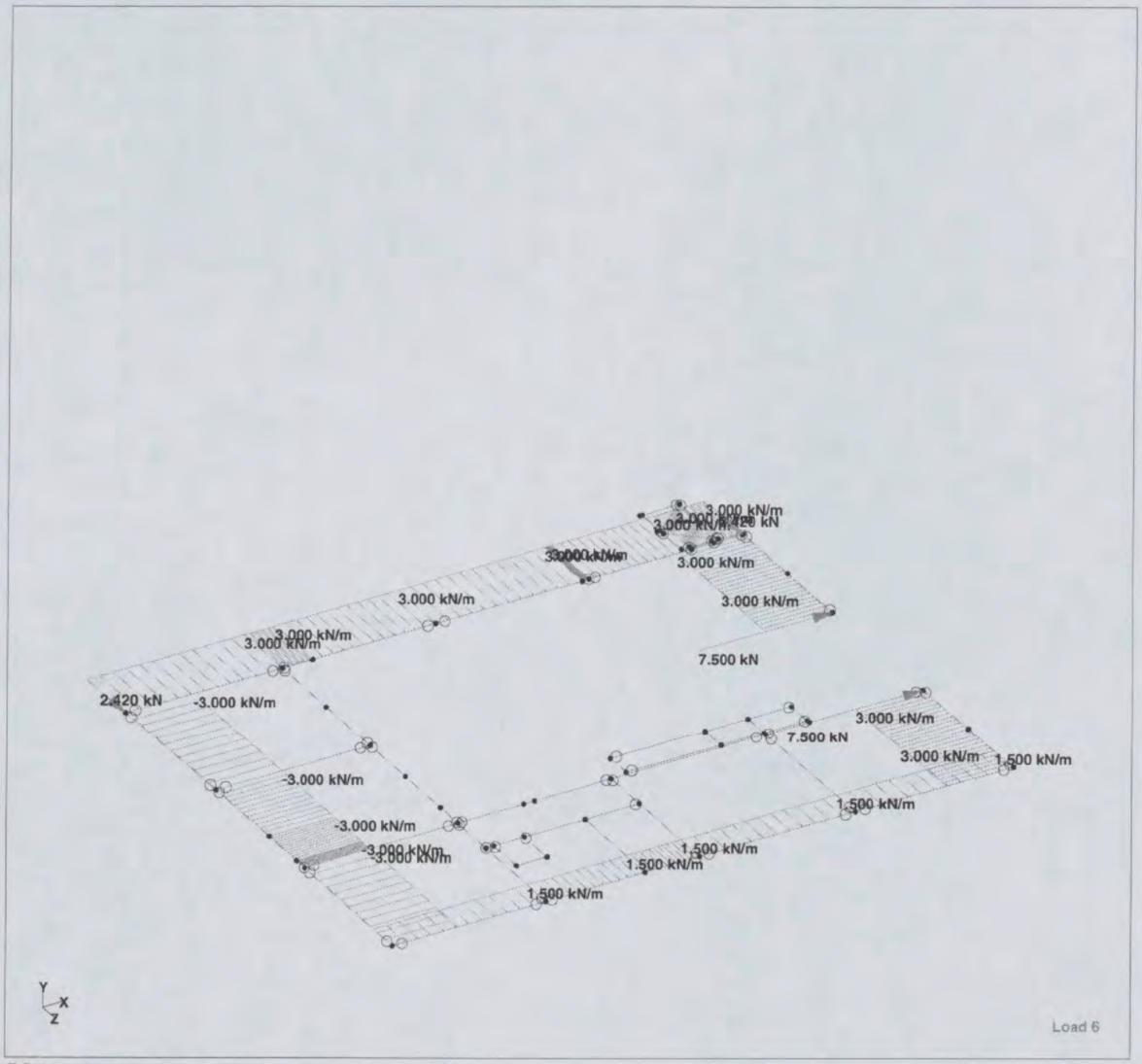
BG 4

the scale towards document

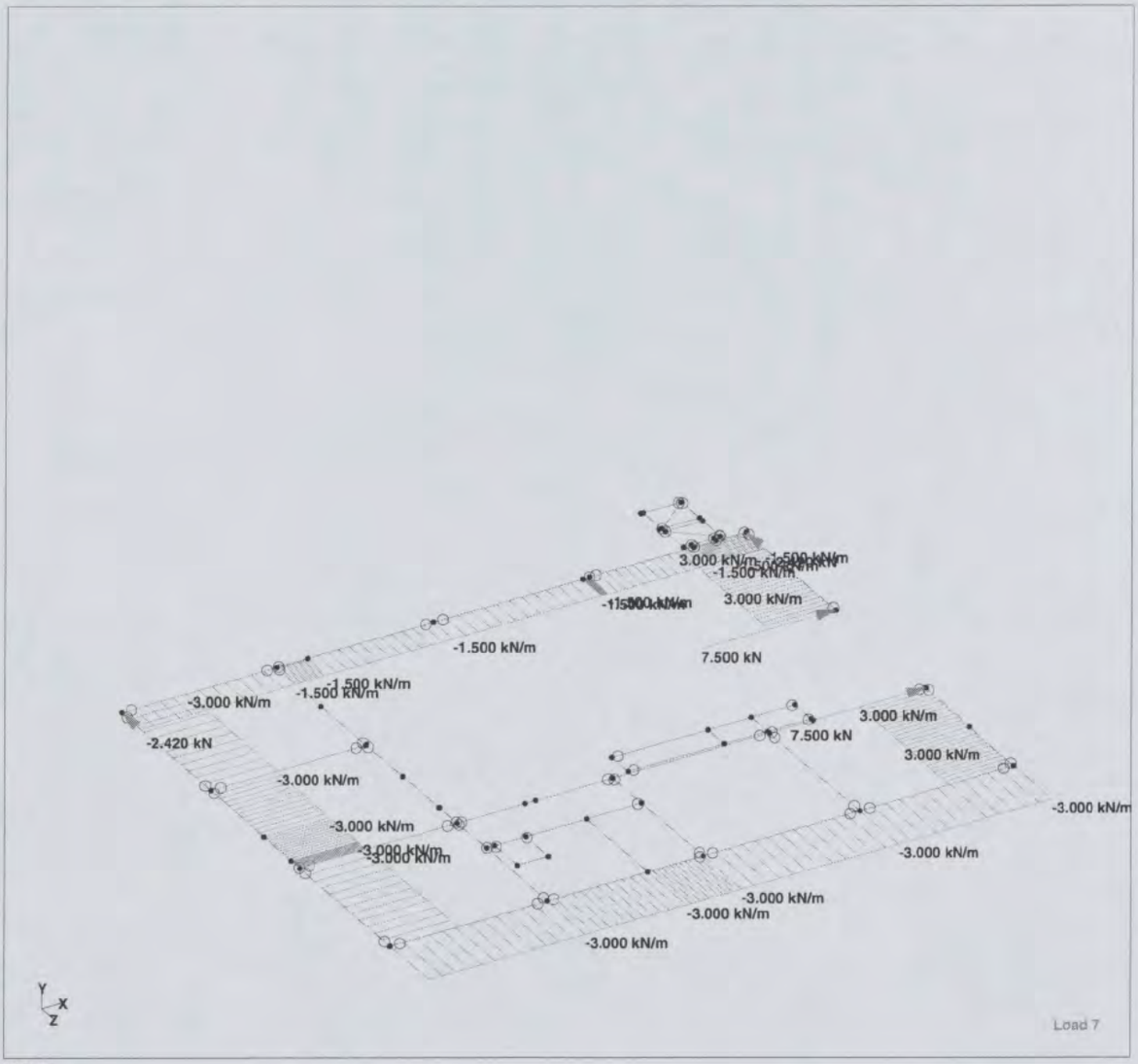


BG 5

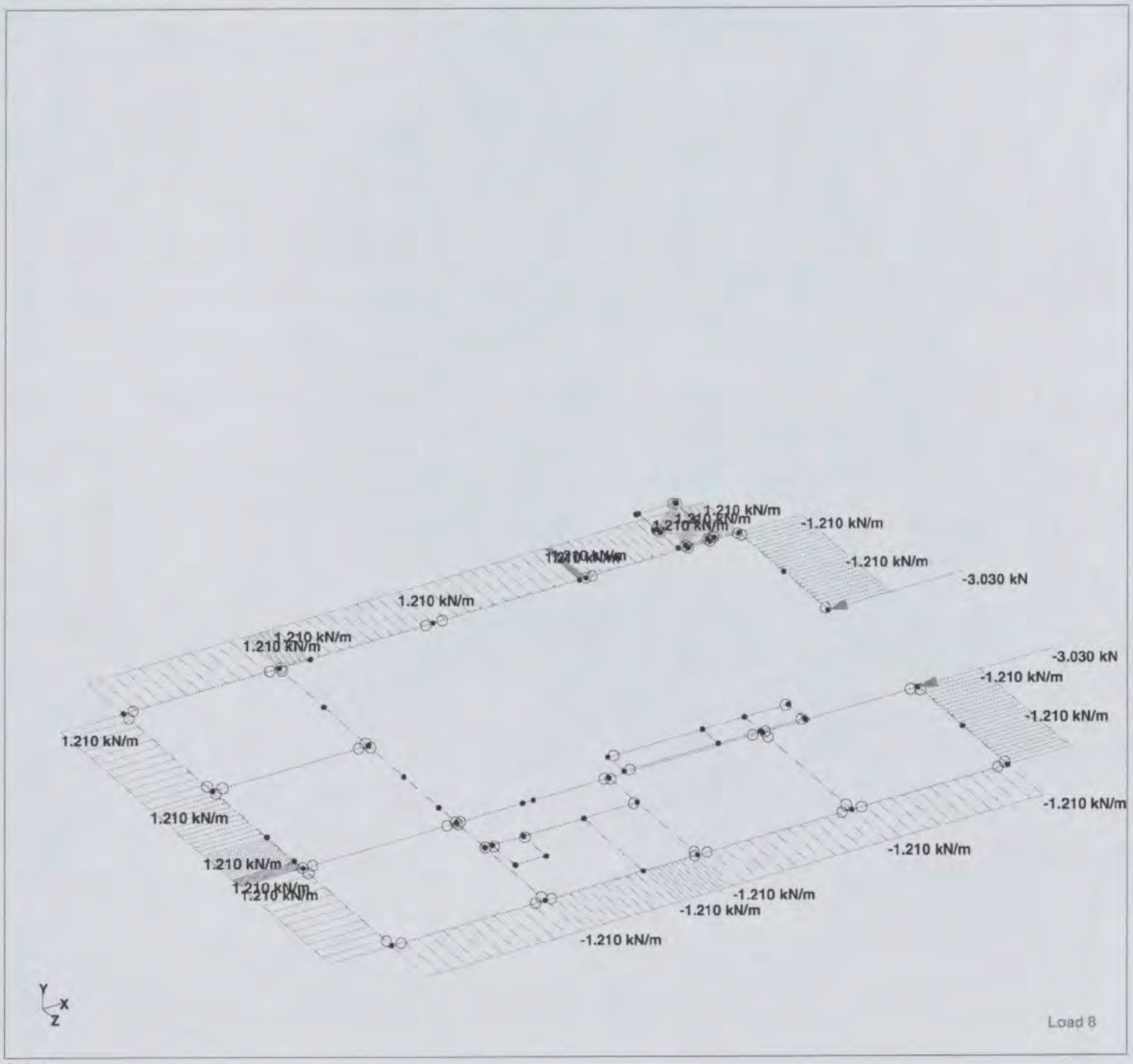
the scale towards document


3.000 kN/m
3.000 kN/m
3.000 kN/m
3.000 kN/m
3.000 kN/m
3.000 kN/m
3.000 kN/m
7.500 kN
2.420 kN
-3.000 kN/m
3.000 kN/m
7.500 kN
3.000 kN/m
1.500 kN/m
-3.000 kN/m
1.500 kN/m
-3.000 kN/m
-3.000 kN/m
-3.000 kN/m
1.500 kN/m
1.500 kN/m
1.500 kN/m
Y
X
Z
Load 6

BG 6

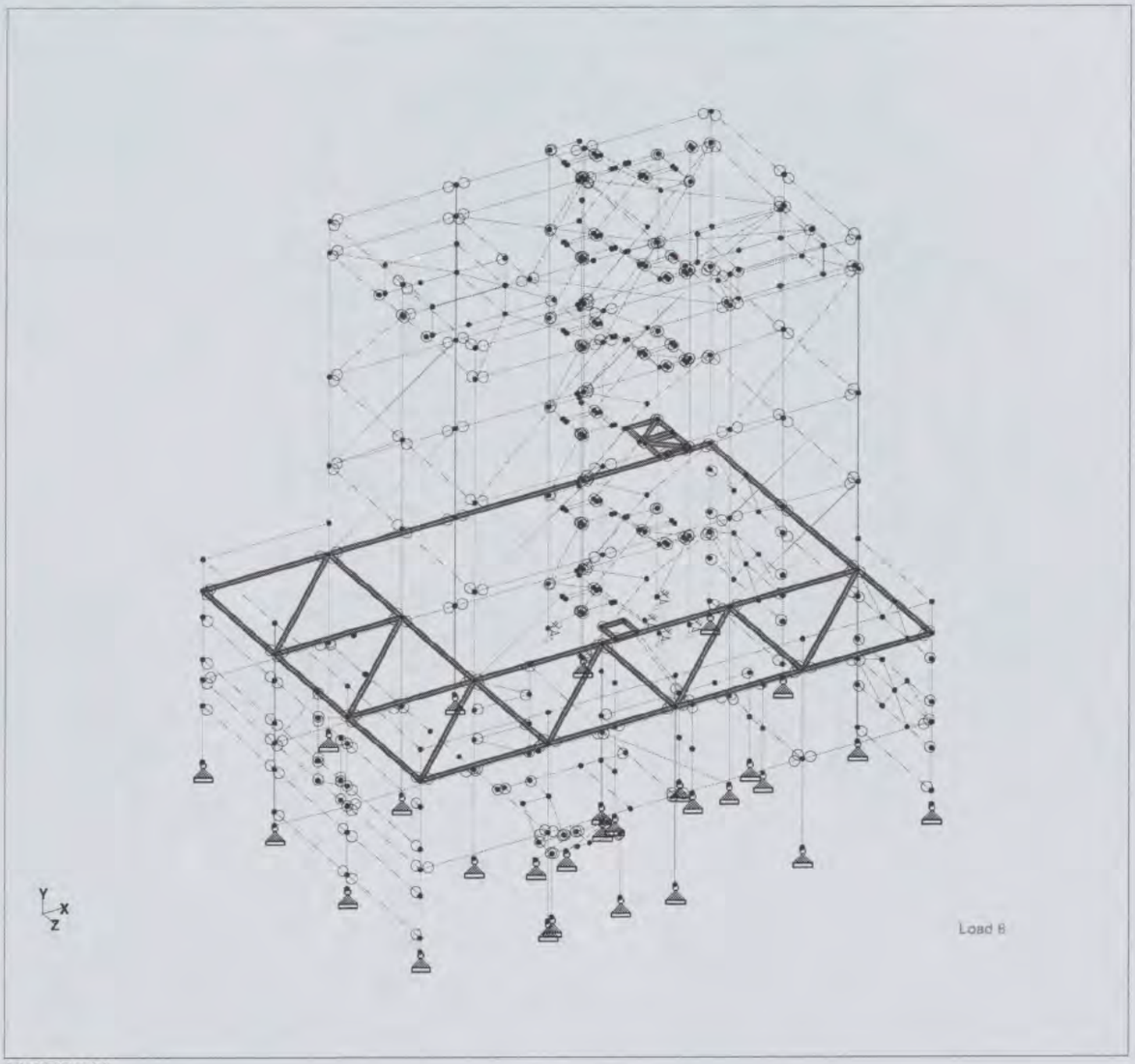

3.000 kN/m
-1.500 kN/m
-1.500 kN/m
3.000 kN/m
-1.500 kN/m
7.500 kN
-1.500 kN/m
-3.000 kN/m
-1.500 kN/m
-2.420 kN
3.000 kN/m
7.500 kN
3.000 kN/m
-3.000 kN/m
-3.000 kN/m
-3.000 kN/m
-3.000 kN/m
-3.000 kN/m
-3.000 kN/m
-3.000 kN/m
-3.000 kN/m
-3.000 kN/m
Y
X
Z
Load 7

BG 7

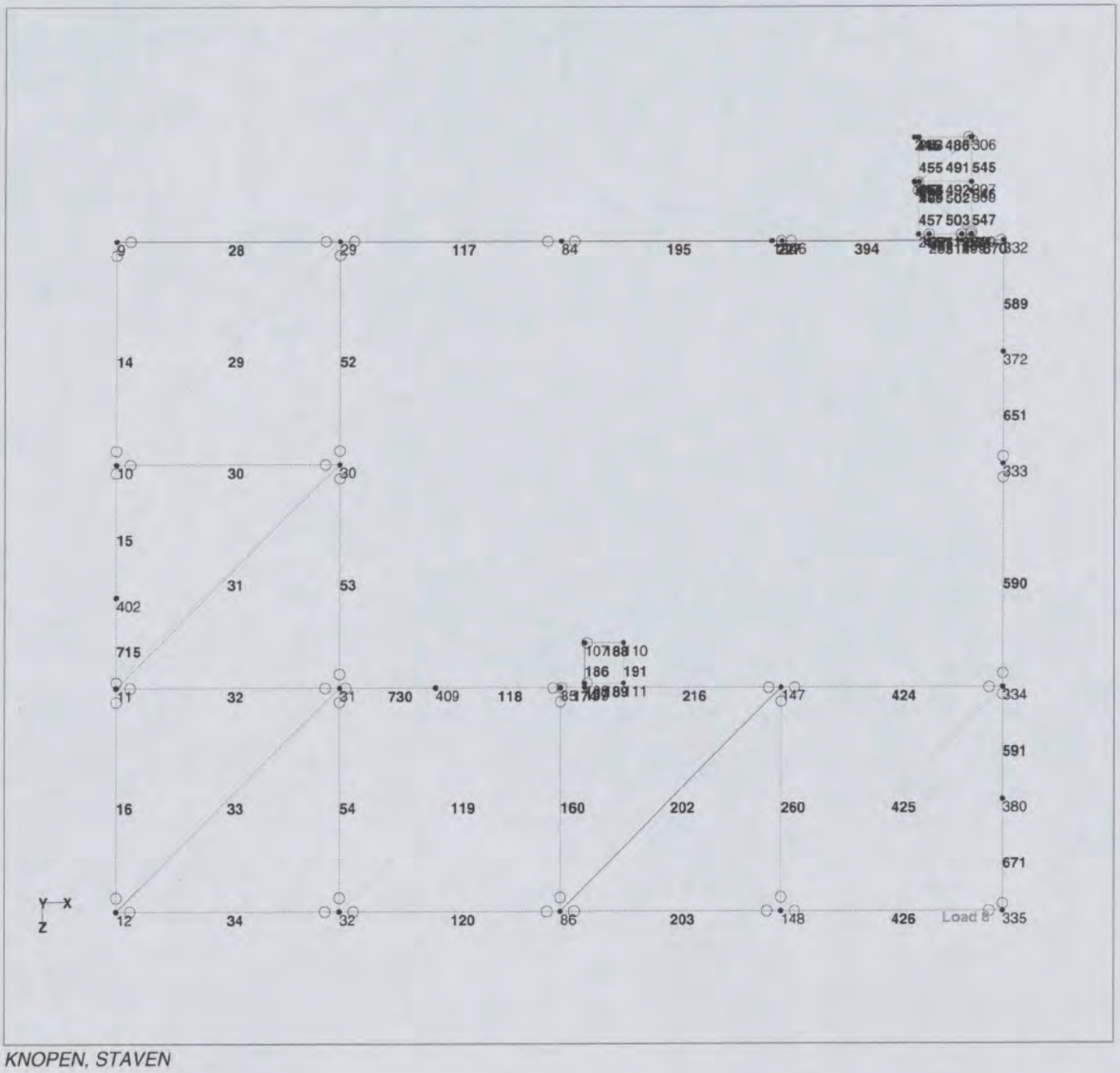


BG 8

CUMAE B.V. **Model Model 8 - 12-12-2007** Software licensed to Cumae B.V.	Job No **20051248.B**	Sheet No **172**	Rev
	Part STAALCONSTRUCTIE PROEFFABRIEK		
Job Title SHELL GLOBAL SOLUTIONS	Ref 04B020		
	By [redacted] Date 07-Jun-07	Chd [redacted]	
Client [redacted]	File Model 8.std	Date/Time 10-Dec-2007 14:22	

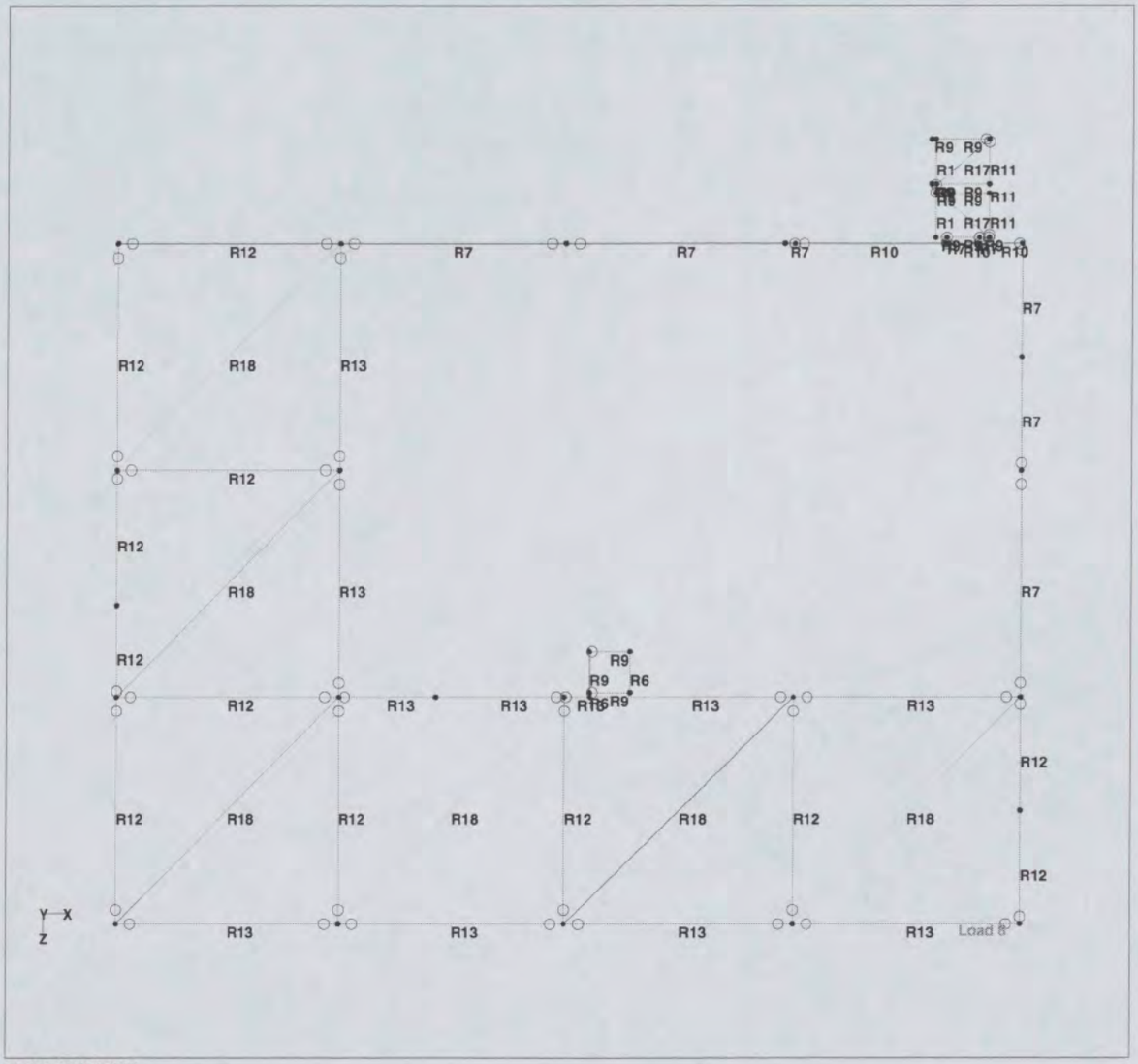


VLOER 7 M+



KNOPEN, STAVEN

the scale towards document



REFERENTIES

CUMAE B.V. Model Model 8 - 12-12-2007	Job No 20051248.B	Sheet No 175	Rev
Software licensed to Cumae B.V.	Part STAALCONSTRUCTIE PROEFFABRIEK		
Job Title SHELL GLOBAL SOLUTIONS	Ref 04B020		
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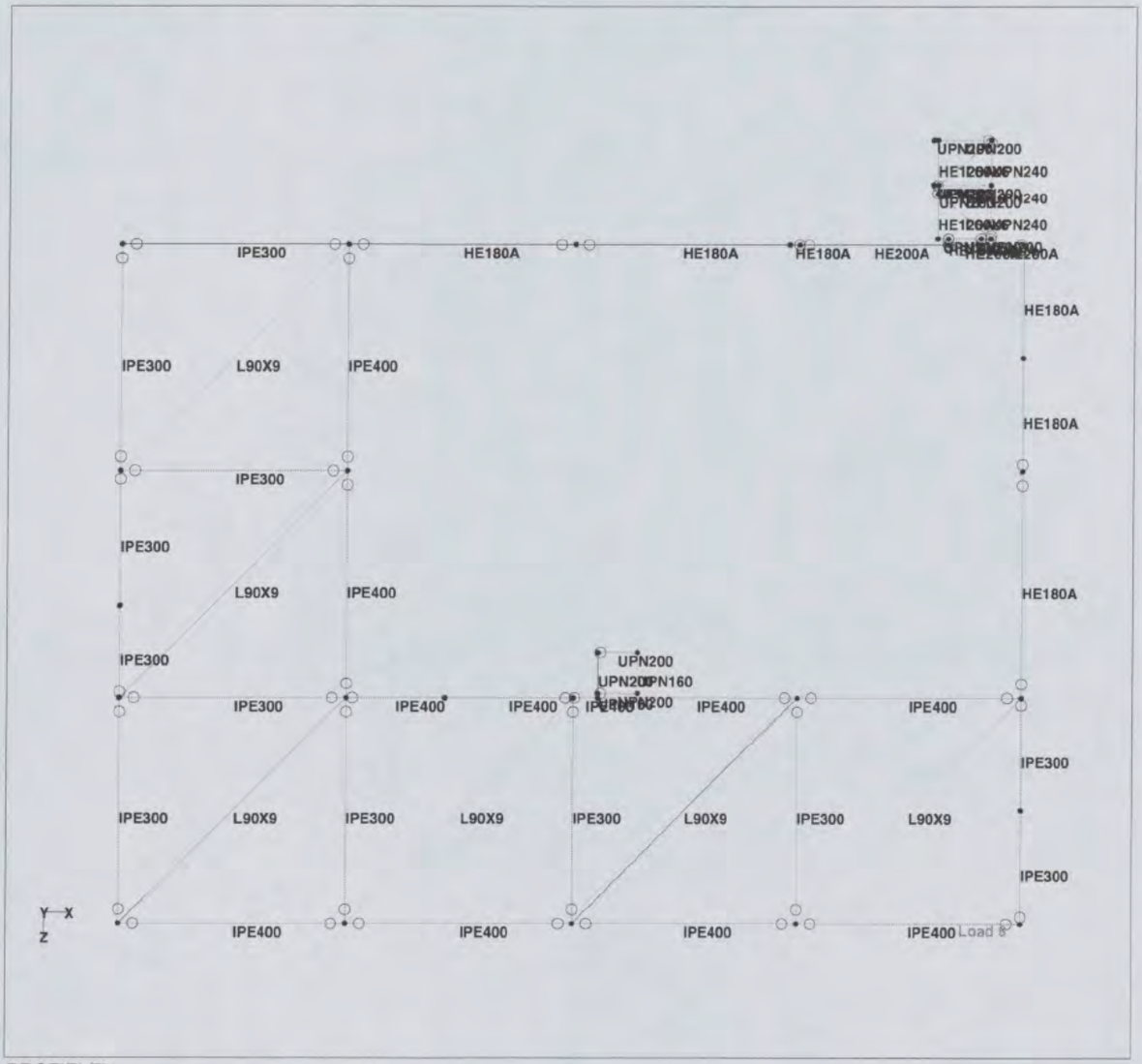
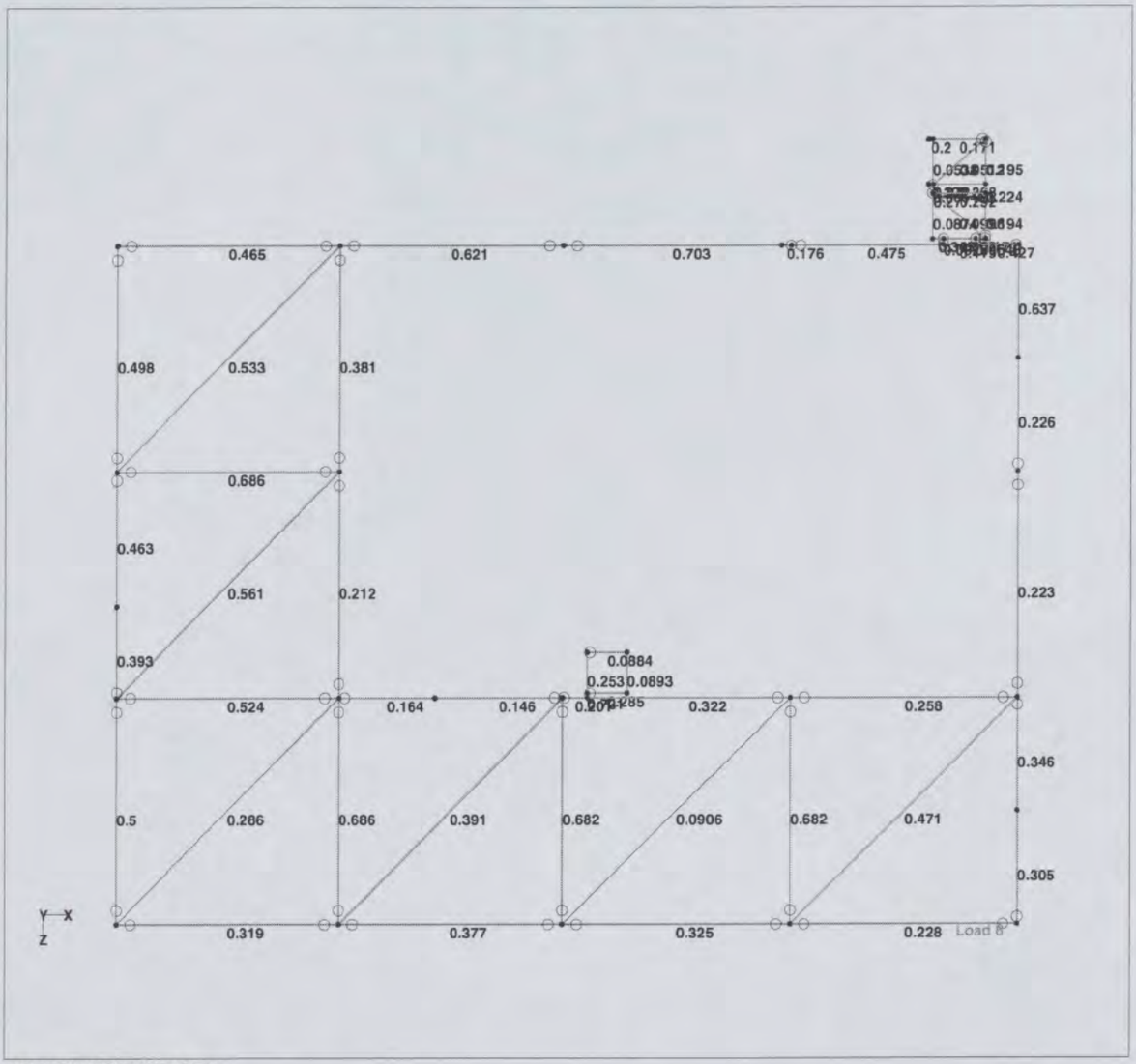
Client [redacted]	File Model 8.std	Date/Time 10-Dec-2007 14:22	



PROFIELEN



TOETSINGSFACTOREN

CUMAE B.V. Model Model 8 - 12-12-2007 Software licensed to Cumae B.V.	Job No 20051248.B	Sheet No 177	Rev
	Part STAALCONSTRUCTIE PROEFFABRIEK		
Job Title SHELL GLOBAL SOLUTIONS	Ref 04B020		
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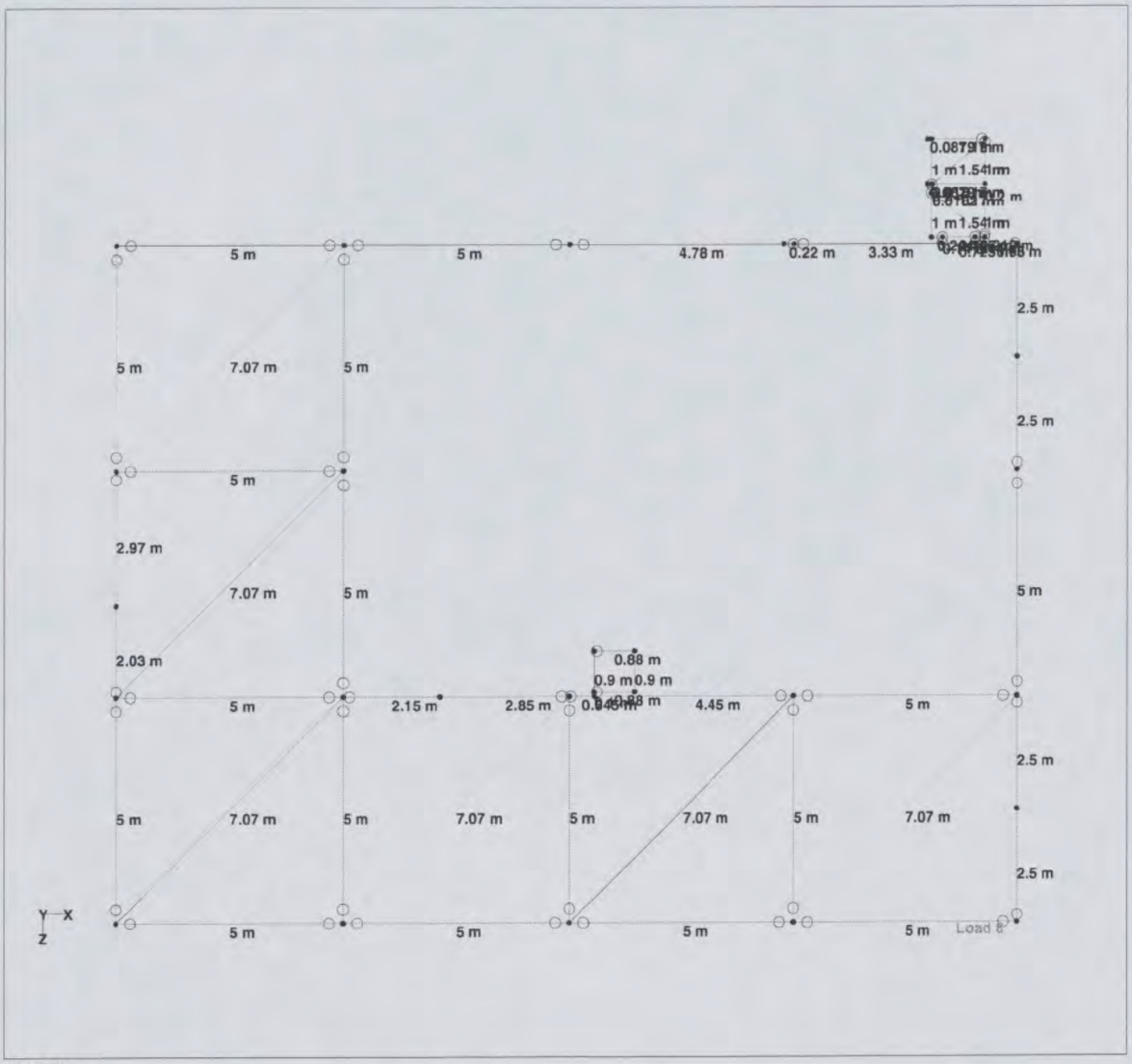
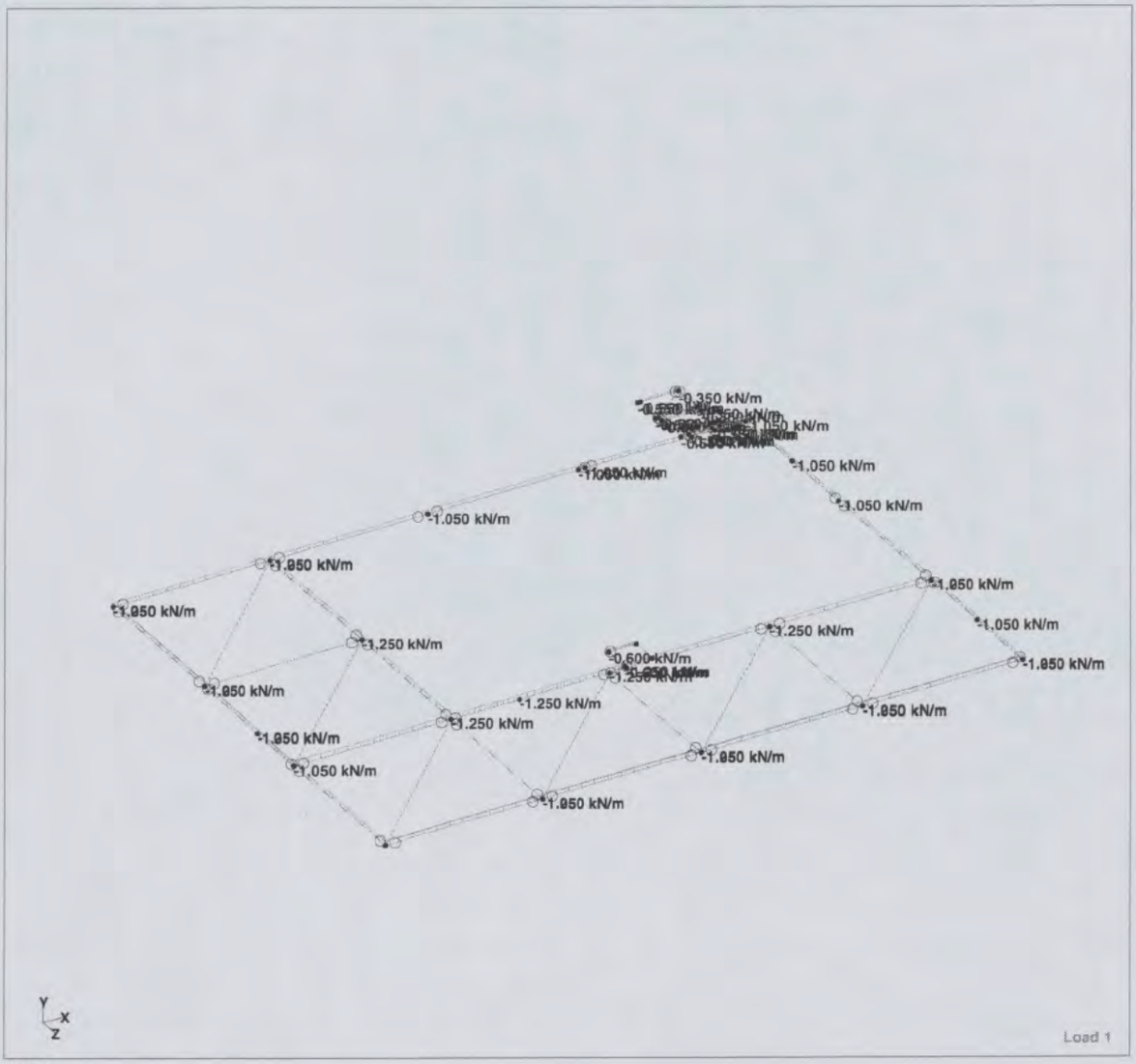
Client [redacted]	File Model 8.std	Date/Time 10-Dec-2007 14:22	



MATEN



BG 1

the scale towards document

CUMAE B.V. Model Model 8 - 12-12-2007 Software licensed to Cumae B.V.	Job No 20051248.B	Sheet No 179	Rev
	Part STAALCONSTRUCTIE PROEFFABRIEK		
Job Title SHELL GLOBAL SOLUTIONS	Ref 04B020		
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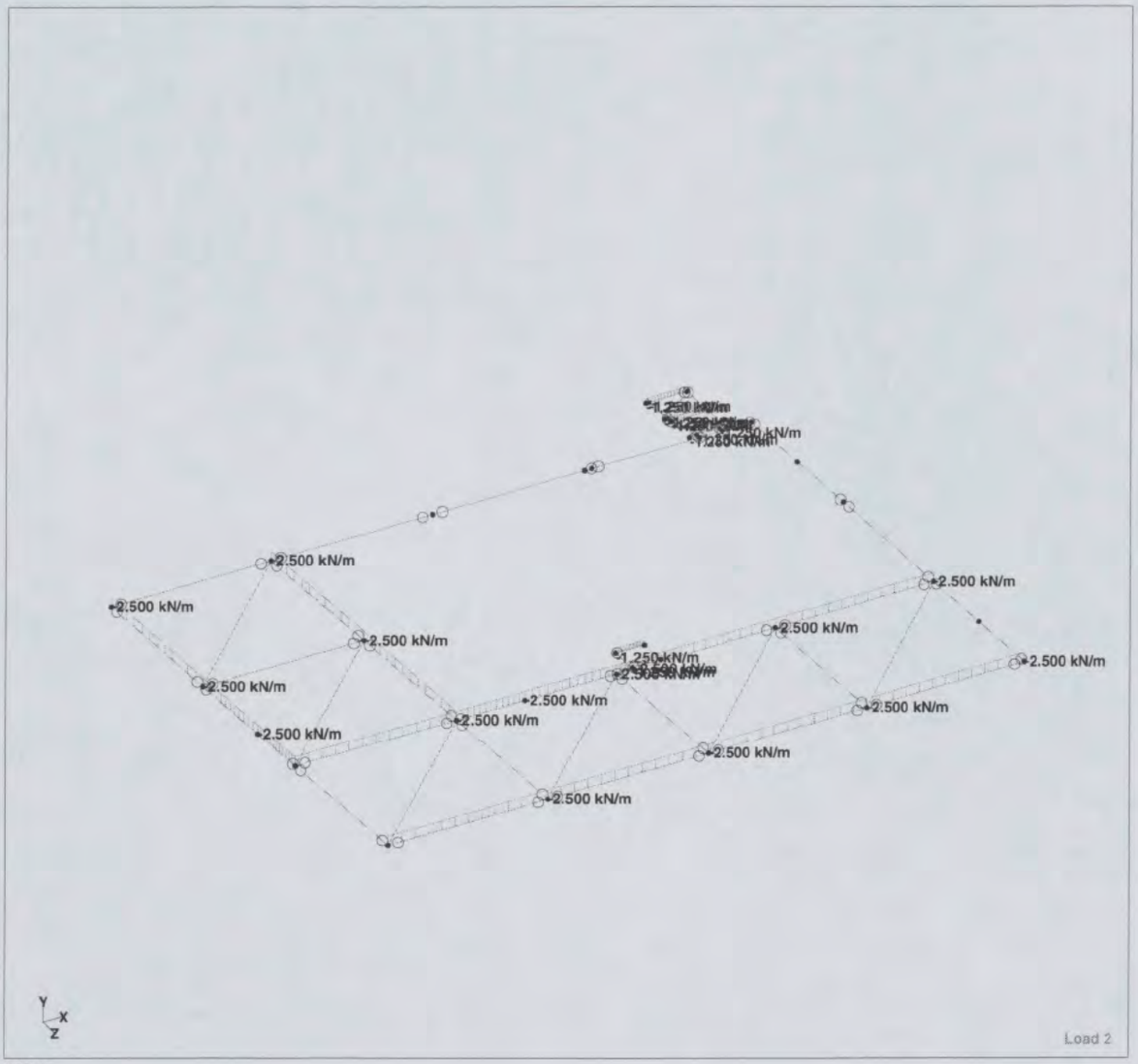
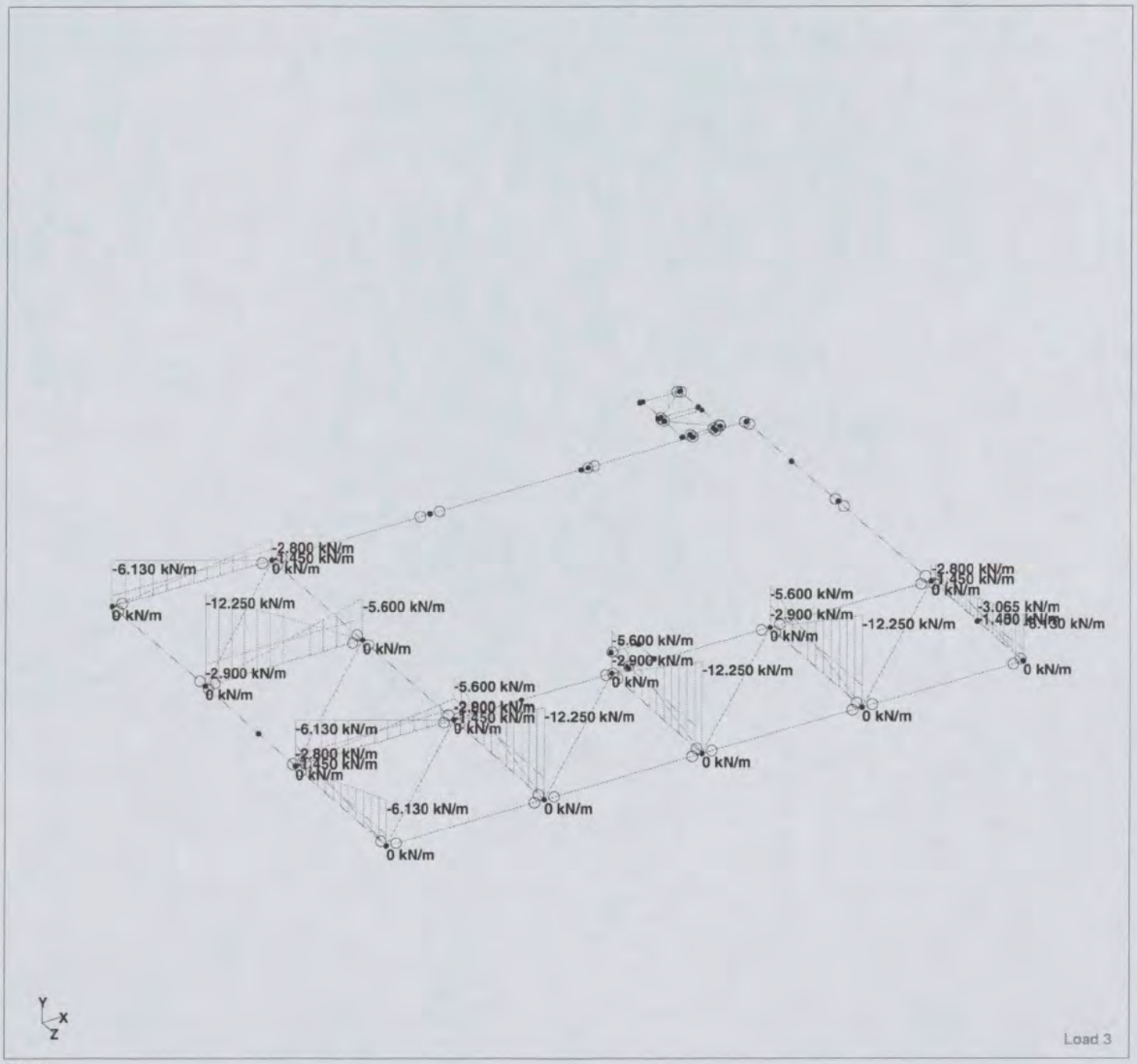


BG 2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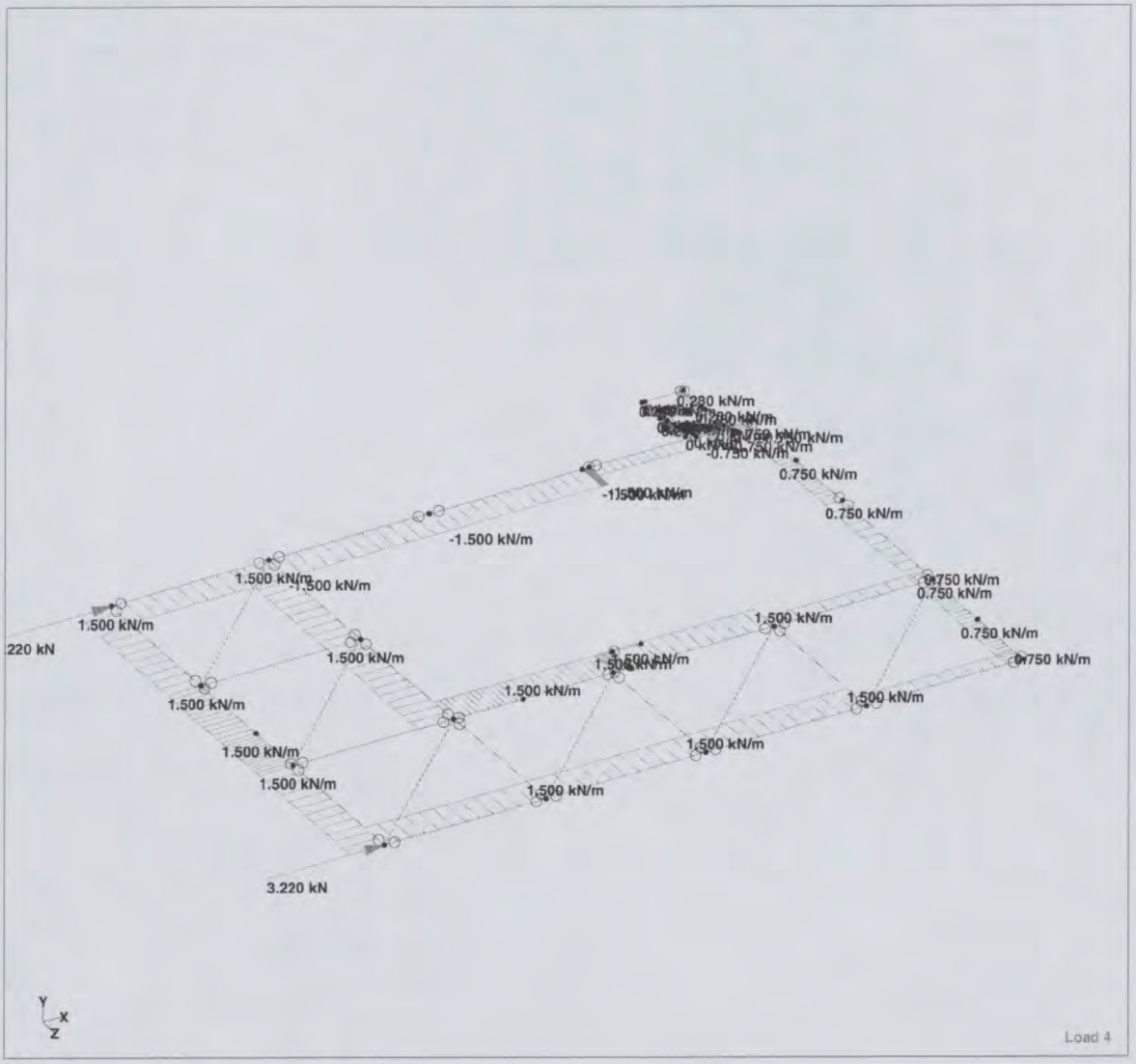
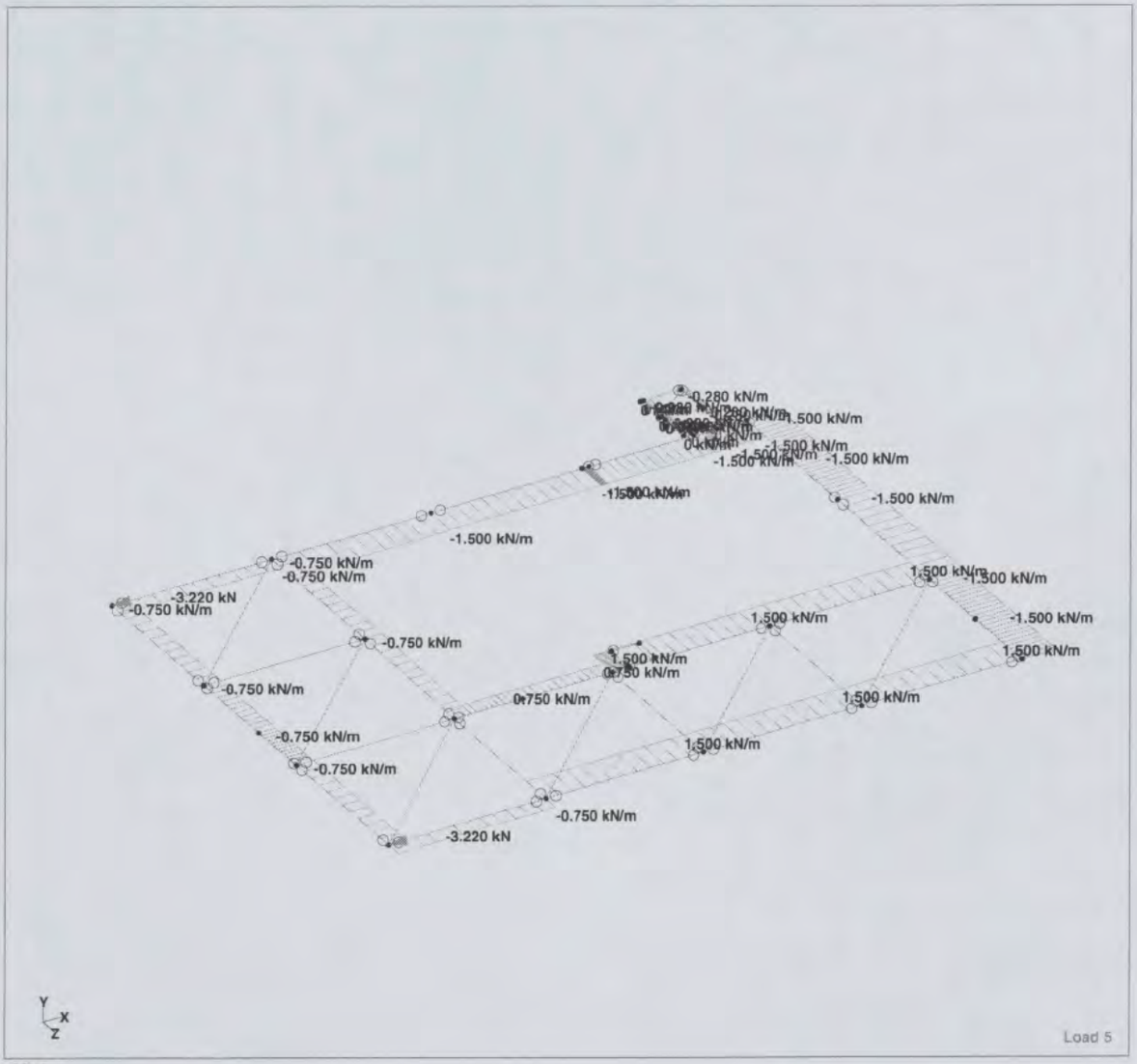
-2.800 kN/m
-1.450 kN/m
0 kN/m
-12.250 kN/m
-5.600 kN/m
-2.900 kN/m
-3.065 kN/m
-1.460 kN/m
-6.430 kN/m
Y
X
Z
Load 3

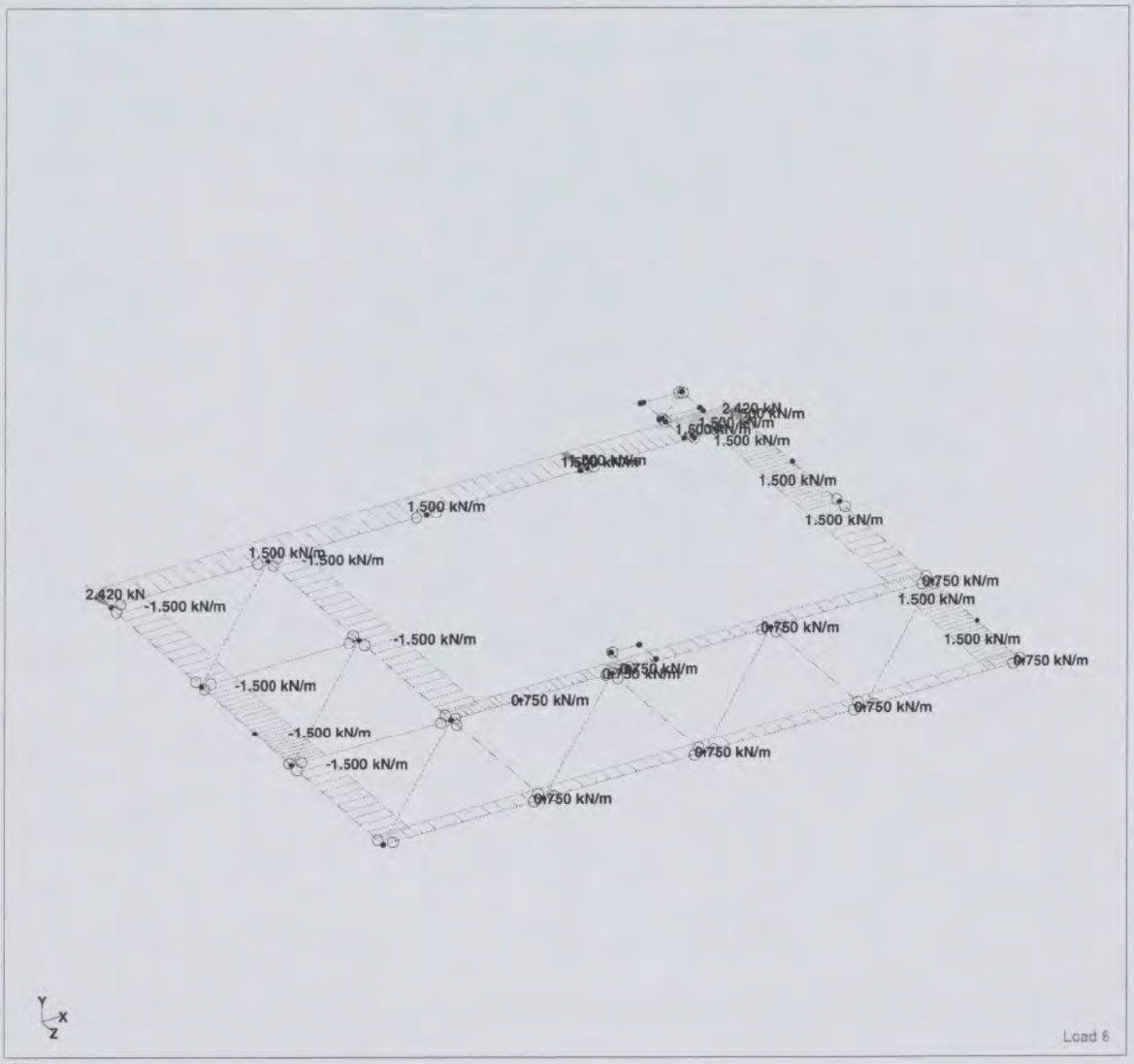
BG 3


0.280 kN/m
0.750 kN/m
-0.750 kN/m
-1.500 kN/m
0.750 kN/m
-1.500 kN/m
1.500 kN/m
1.500 kN/m
220 kN
1.500 kN/m
1.500 kN/m
1.500 kN/m
1.500 kN/m
1.500 kN/m
1.500 kN/m
1.500 kN/m
1.500 kN/m
1.500 kN/m
3.220 kN
Y
X
Z
Load 4

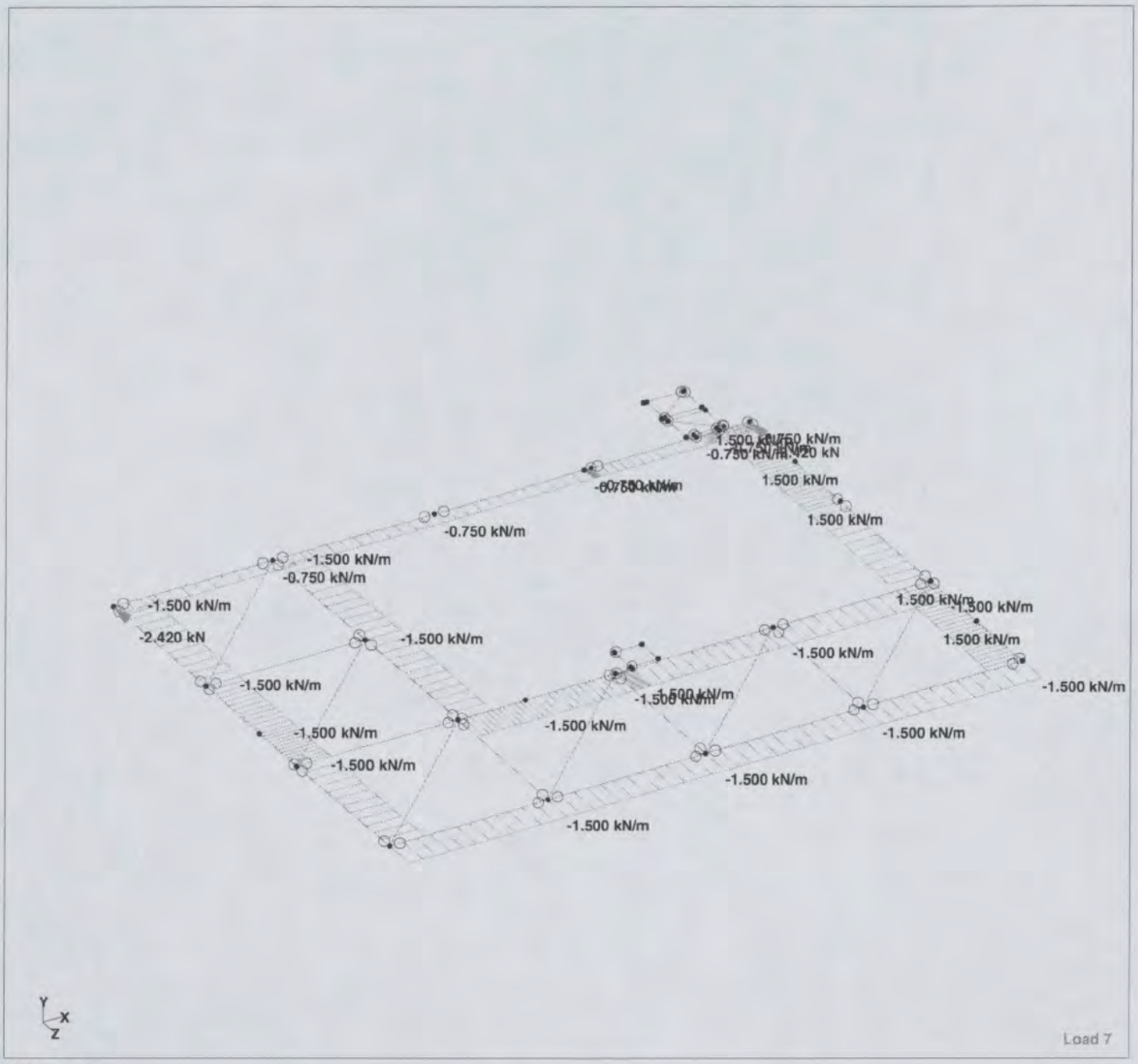
BG 4


-0.280 kN/m
-1.500 kN/m
-1.500 kN/m
-1.500 kN/m
-1.500 kN/m
-1.500 kN/m
-1.500 kN/m
-1.500 kN/m
-0.750 kN/m
-0.750 kN/m
-3.220 kN
-0.750 kN/m
-0.750 kN/m
-0.750 kN/m
-0.750 kN/m
-0.750 kN/m
-0.750 kN/m
-0.750 kN/m
-3.220 kN
1.500 kN/m
1.500 kN/m
1.500 kN/m
1.500 kN/m
1.500 kN/m
1.500 kN/m
1.500 kN/m
Y
X
Z
Load 5

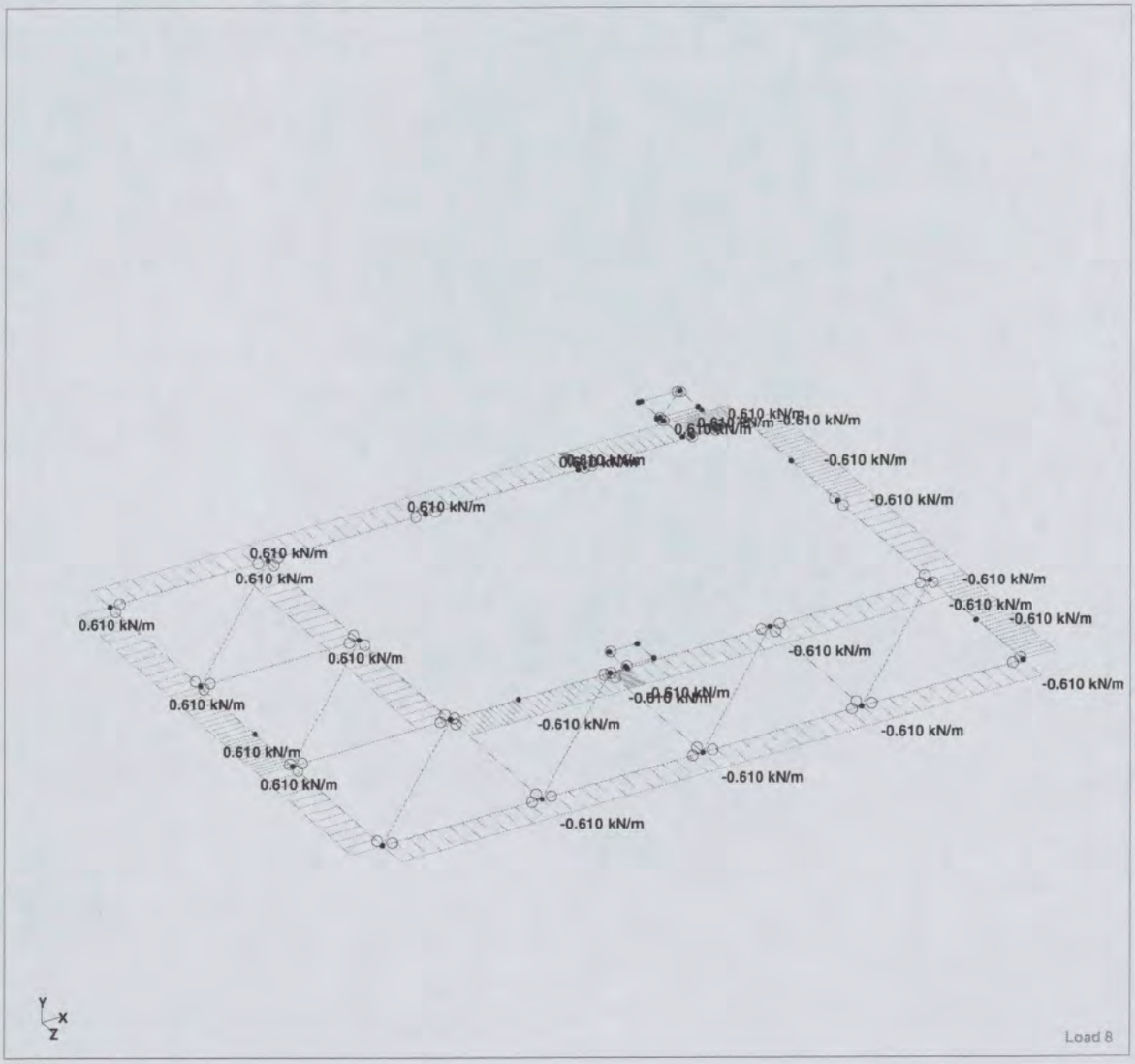
BG 5


2.420 kN
1.500 kN/m
1.500 kN/m
1.500 kN/m
1.500 kN/m
1.500 kN/m
1.500 kN/m
1.500 kN/m
1.500 kN/m
2.420 kN
-1.500 kN/m
-1.500 kN/m
-1.500 kN/m
-1.500 kN/m
-1.500 kN/m
-1.500 kN/m
0.750 kN/m
0.750 kN/m
0.750 kN/m
0.750 kN/m
0.750 kN/m
0.750 kN/m
0.750 kN/m
0.750 kN/m
1.500 kN/m
1.500 kN/m
Y
X
Z
Load 6

BG 6

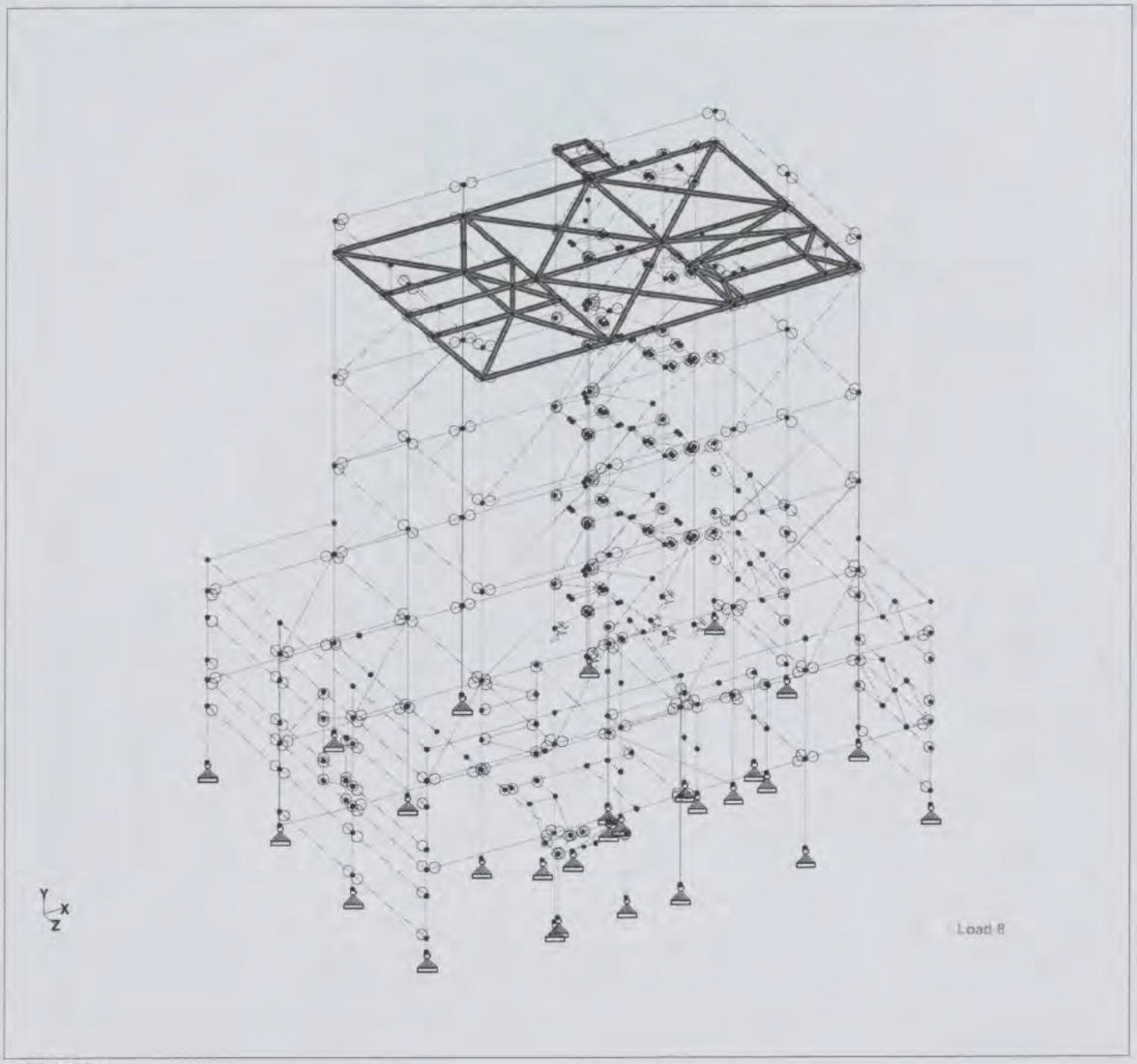


BG 7



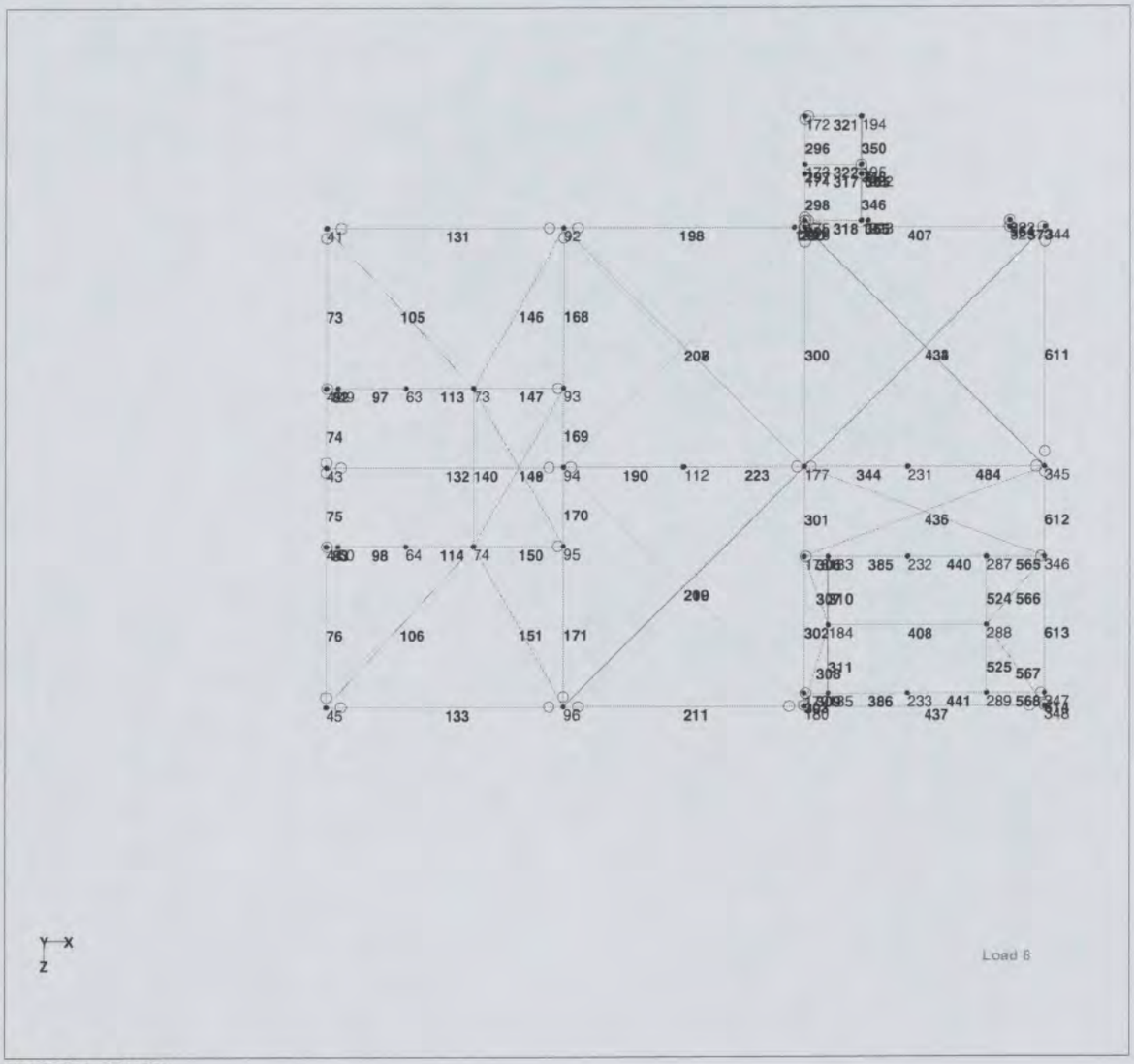
BG 8

CUMAE B.V. Model Model 8 - 12-12-2007 Software licensed to Cumae B.V.	Job No 20051248.B	Sheet No 186	Rev
	Part STAALCONSTRUCTIE PROEFFABRIEK		
Job Title SHELL GLOBAL SOLUTIONS	Ref 04B020		
	By [redacted]	Date 07-Jun-07	Chd [redacted]
Client [redacted]	File Model 8.std	Date/Time 10-Dec-2007 14:22	

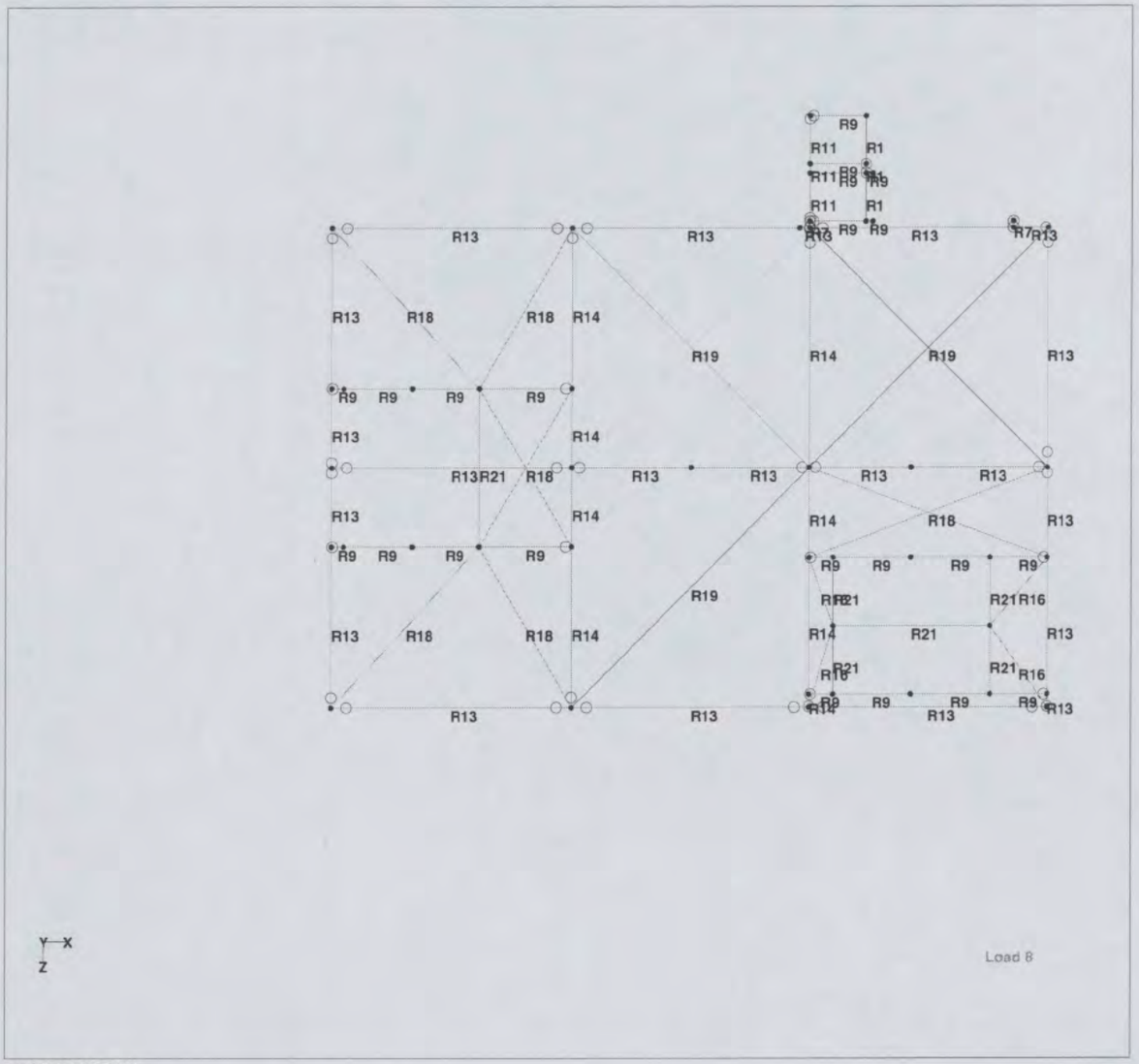


DAKVLOER

the scale towards document
C1 B1 A1 C2 B2 A2 B5 A5 20 18 17 16 11
10 09 03 02 01 C7 B7 A7 C8 B8 A8 C9 B9
Image Engineering Scan Reference Chart TE263 Serial No. 380
Patch Reference numbers on UTT



KNOPEN, STAVEN



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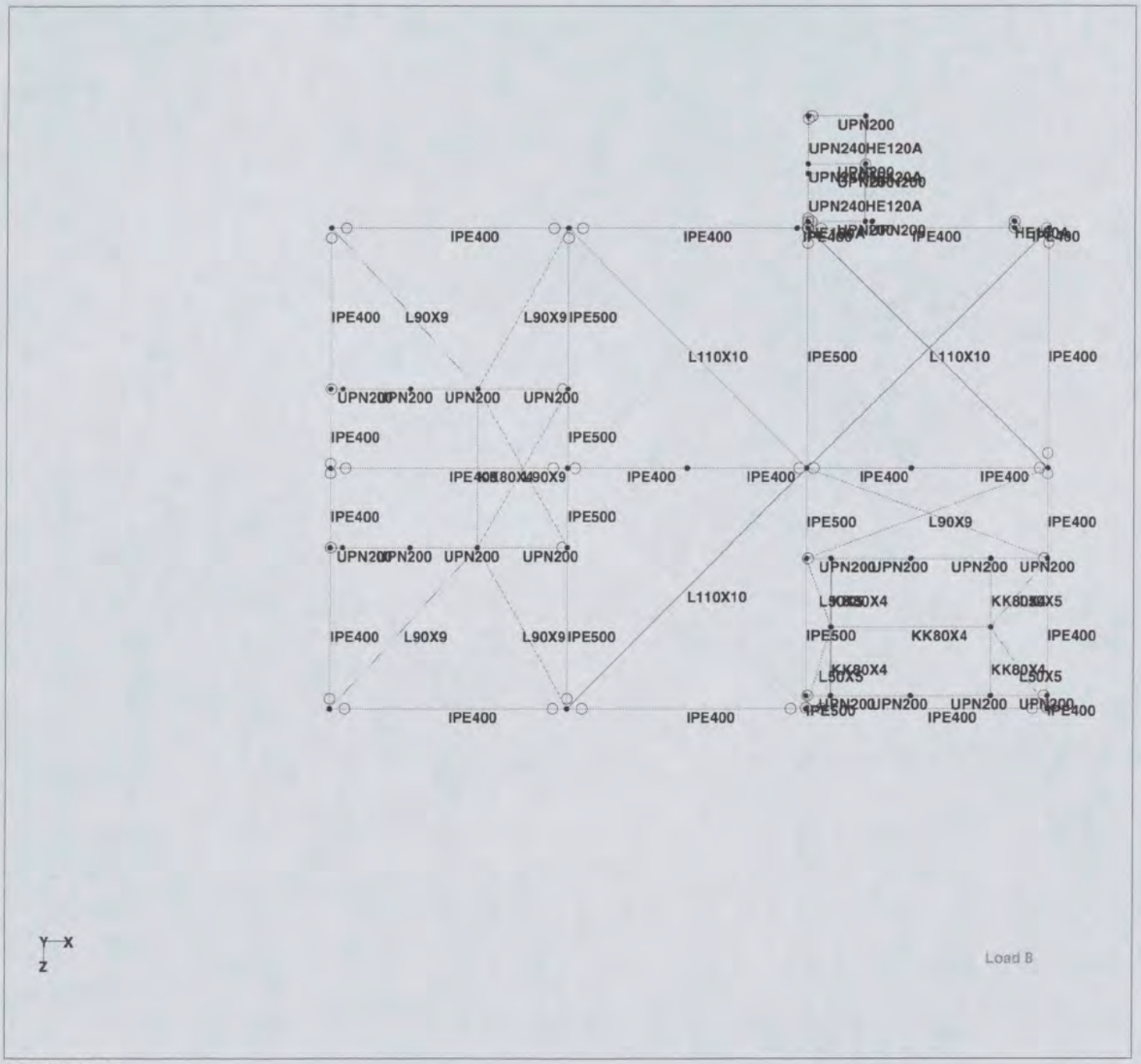
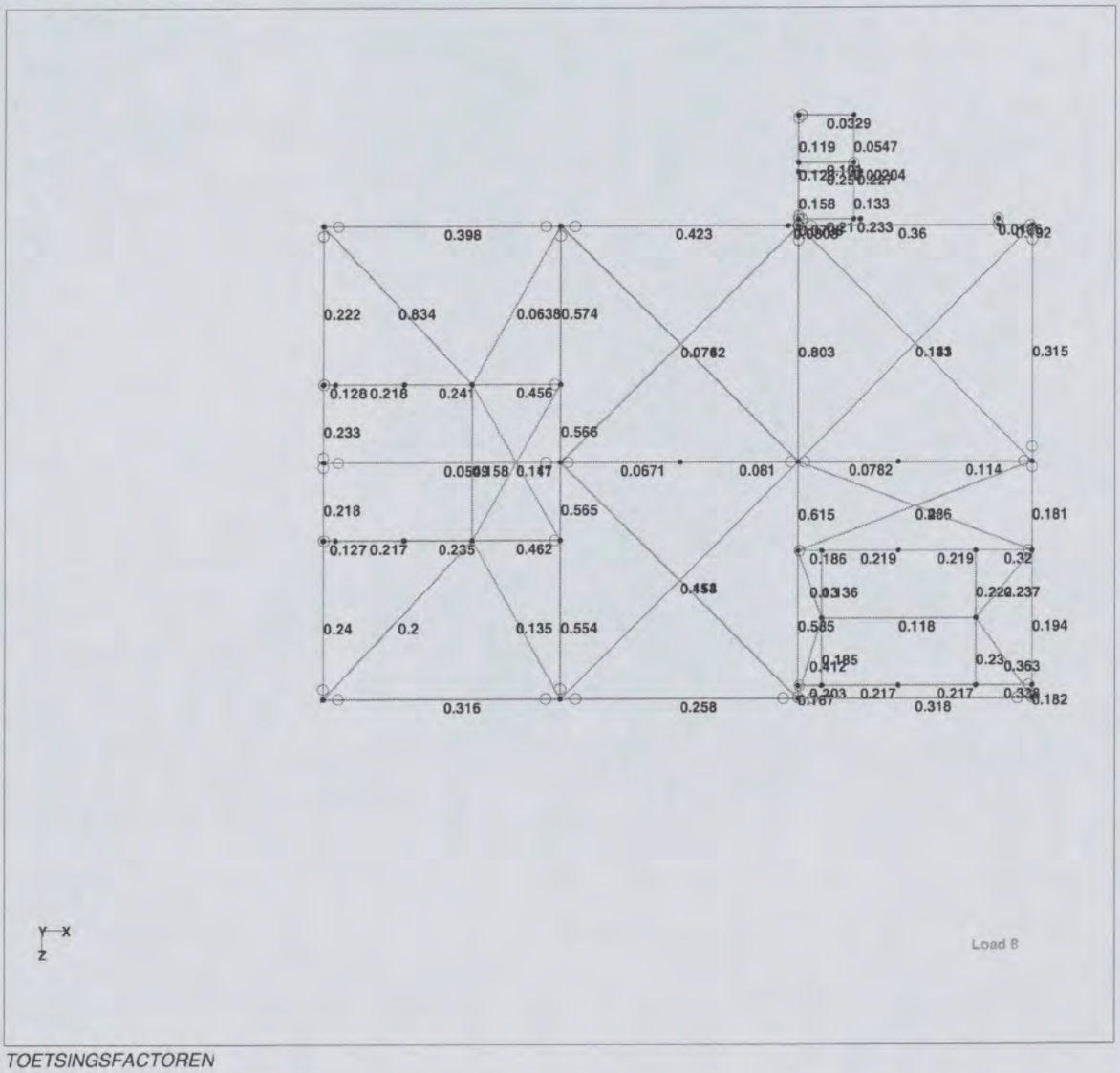
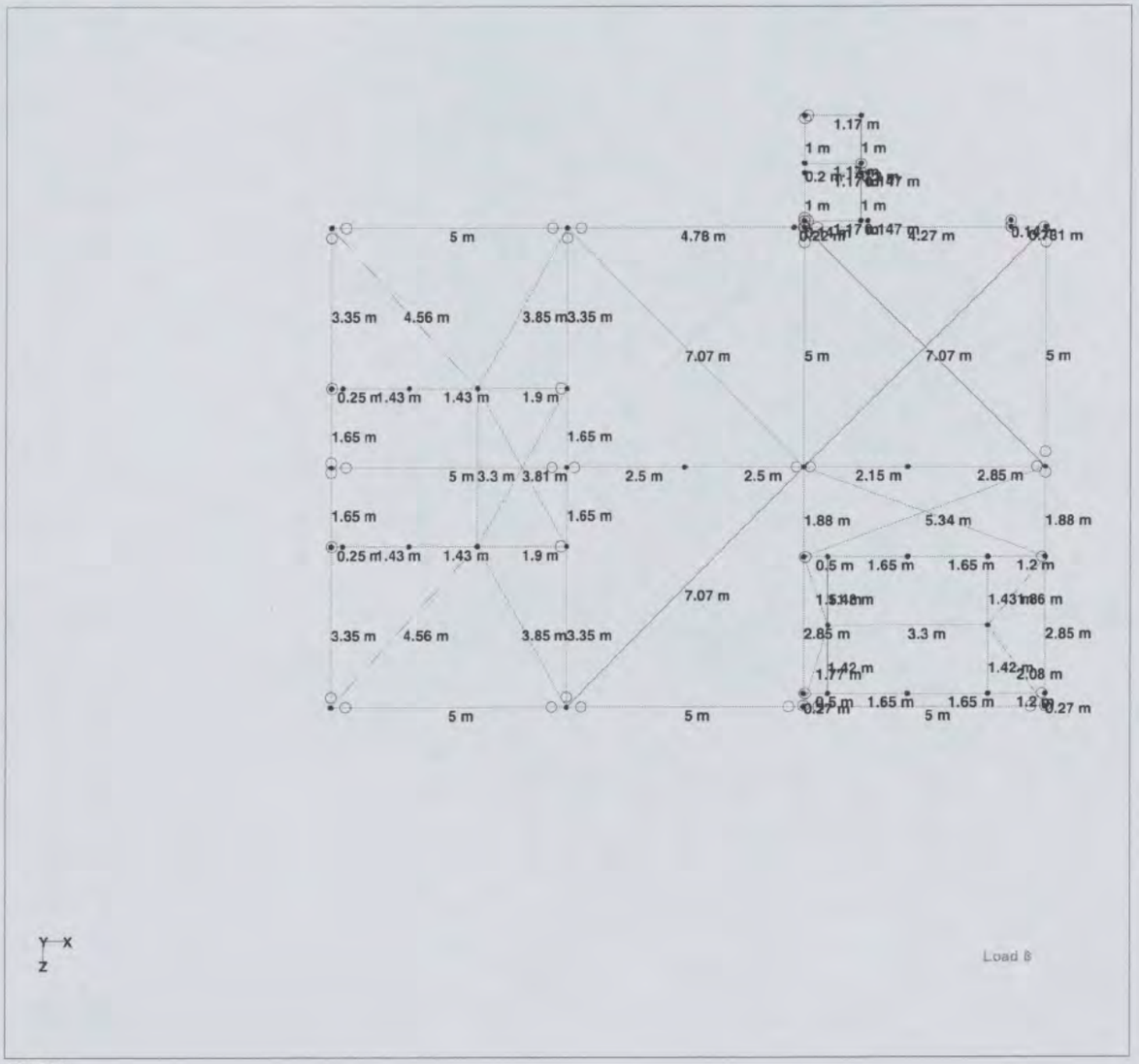

UPN200
UPN240HE120A
UPN240HE120A
IPE400
IPE400
IPE400
IPE400
L90X9
L90X9
IPE500
L110X10
IPE500
L110X10
IPE400
UPN200
UPN200
UPN200
UPN200
IPE400
IPE500
IPE400
IPE400
IPE400
IPE400
IPE400
IPE500
IPE500
L90X9
IPE400
UPN200
UPN200
UPN200
UPN200
UPN200
UPN200
UPN200
UPN200
L110X10
KK80X4
KK80X5
IPE400
L90X9
L90X9
IPE500
IPE500
KK80X4
IPE400
KK80X4
KK80X4
L50X5
L50X5
UPN200
UPN200
UPN200
UPN200
IPE400
IPE400
IPE500
IPE400
IPE400
Y
X
Z
Load B

PROFIELEN



TOETSINGSFACTOREN


1.17 m
1 m
1 m
5 m
4.78 m
1.27 m
3.35 m
4.56 m
3.85 m
3.35 m
7.07 m
5 m
7.07 m
5 m
0.25 m
1.43 m
1.43 m
1.9 m
1.65 m
1.65 m
5 m
3.3 m
3.81 m
2.5 m
2.5 m
2.15 m
2.85 m
1.65 m
1.65 m
1.88 m
5.34 m
1.88 m
0.25 m
1.43 m
1.43 m
1.9 m
0.5 m
1.65 m
1.65 m
1.2 m
7.07 m
3.35 m
4.56 m
3.85 m
3.35 m
2.85 m
3.3 m
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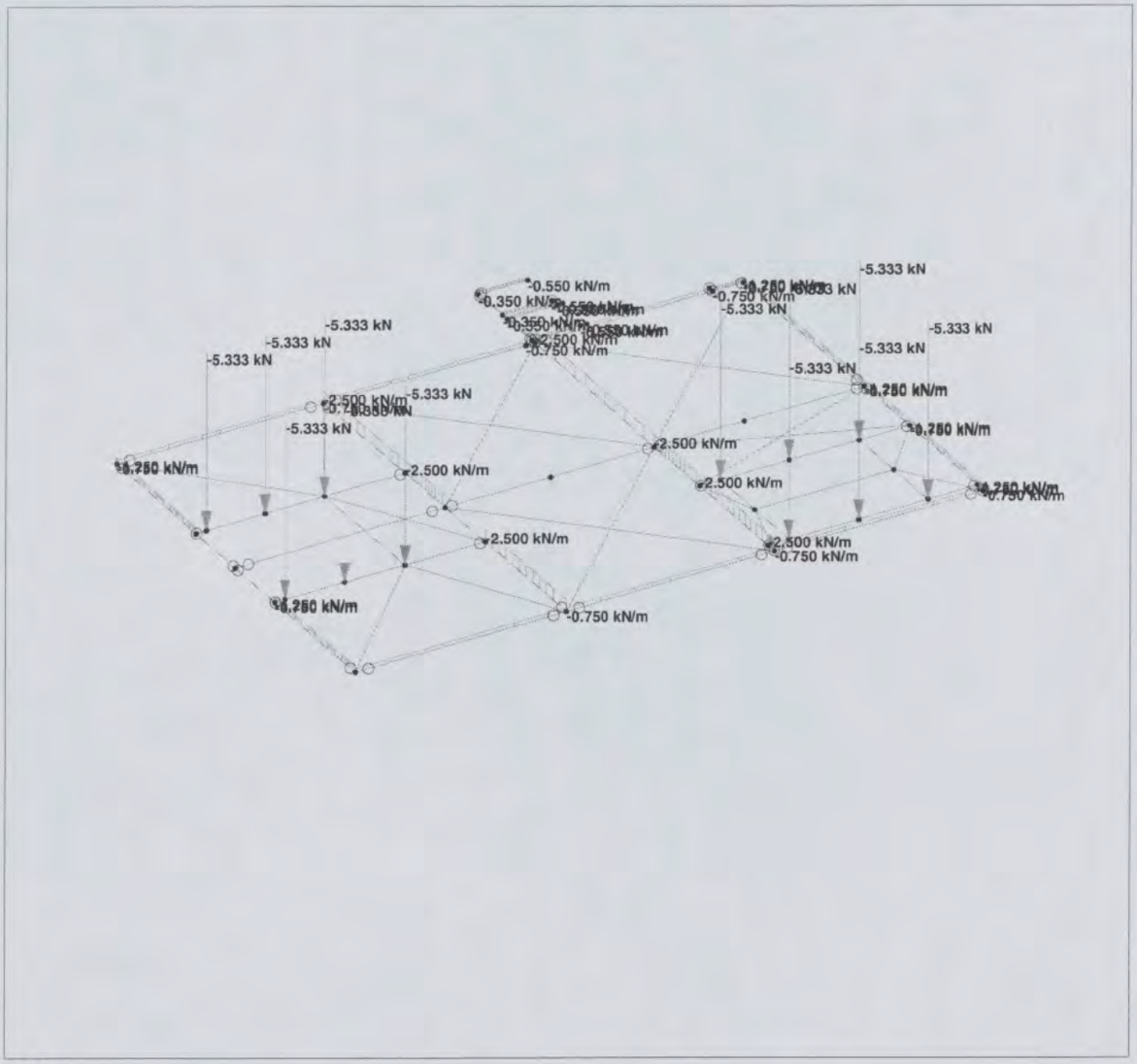
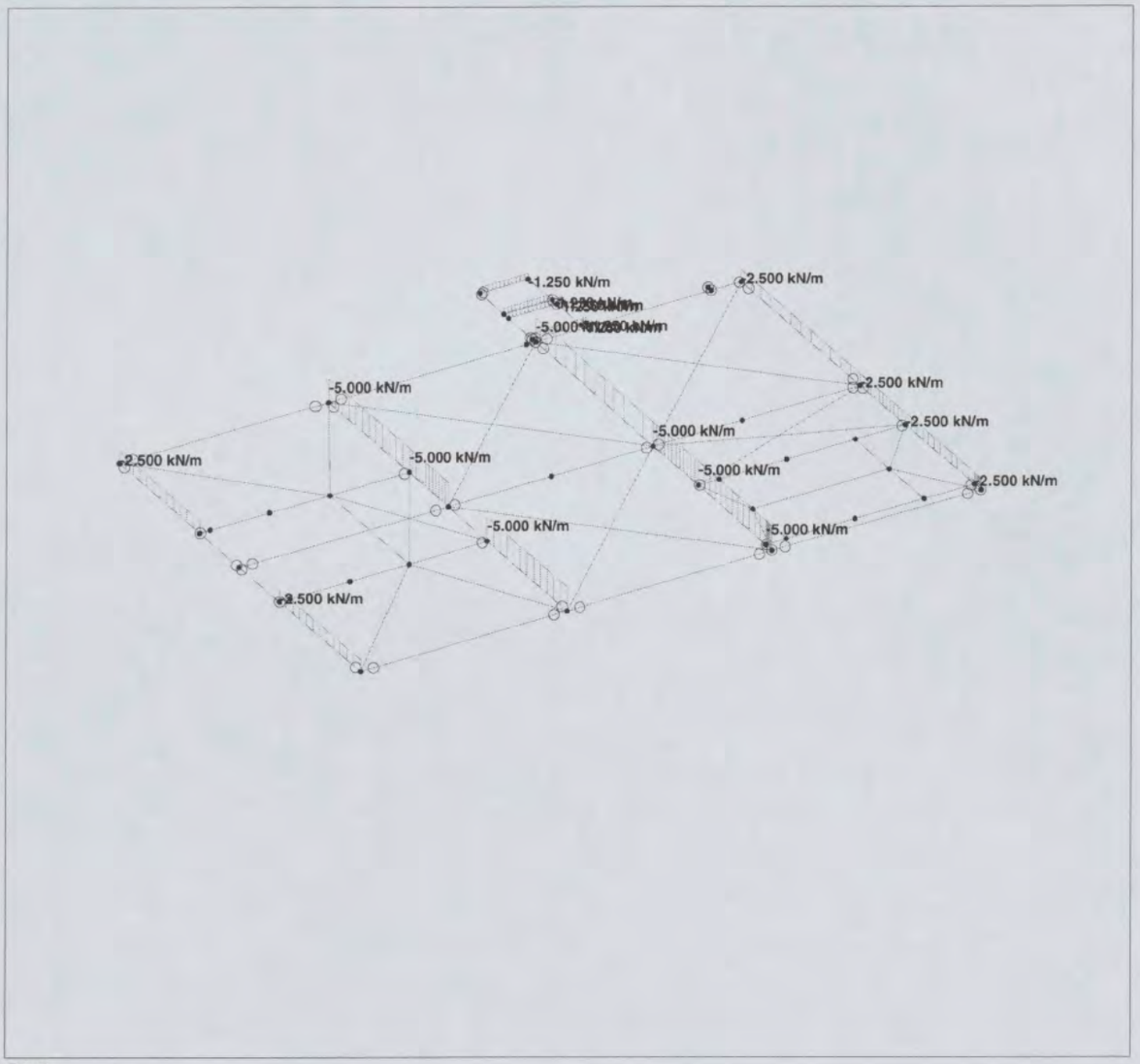
1.42 m
1.42 m
2.08 m
5 m
5 m
5 m
Y
X
Z
Load 8

MATEN


-0.550 kN/m
-0.350 kN/m
-0.750 kN/m
-5.333 kN
-2.500 kN/m
-0.250 kN/m
2.500 kN/m
-0.750 kN/m

BG 1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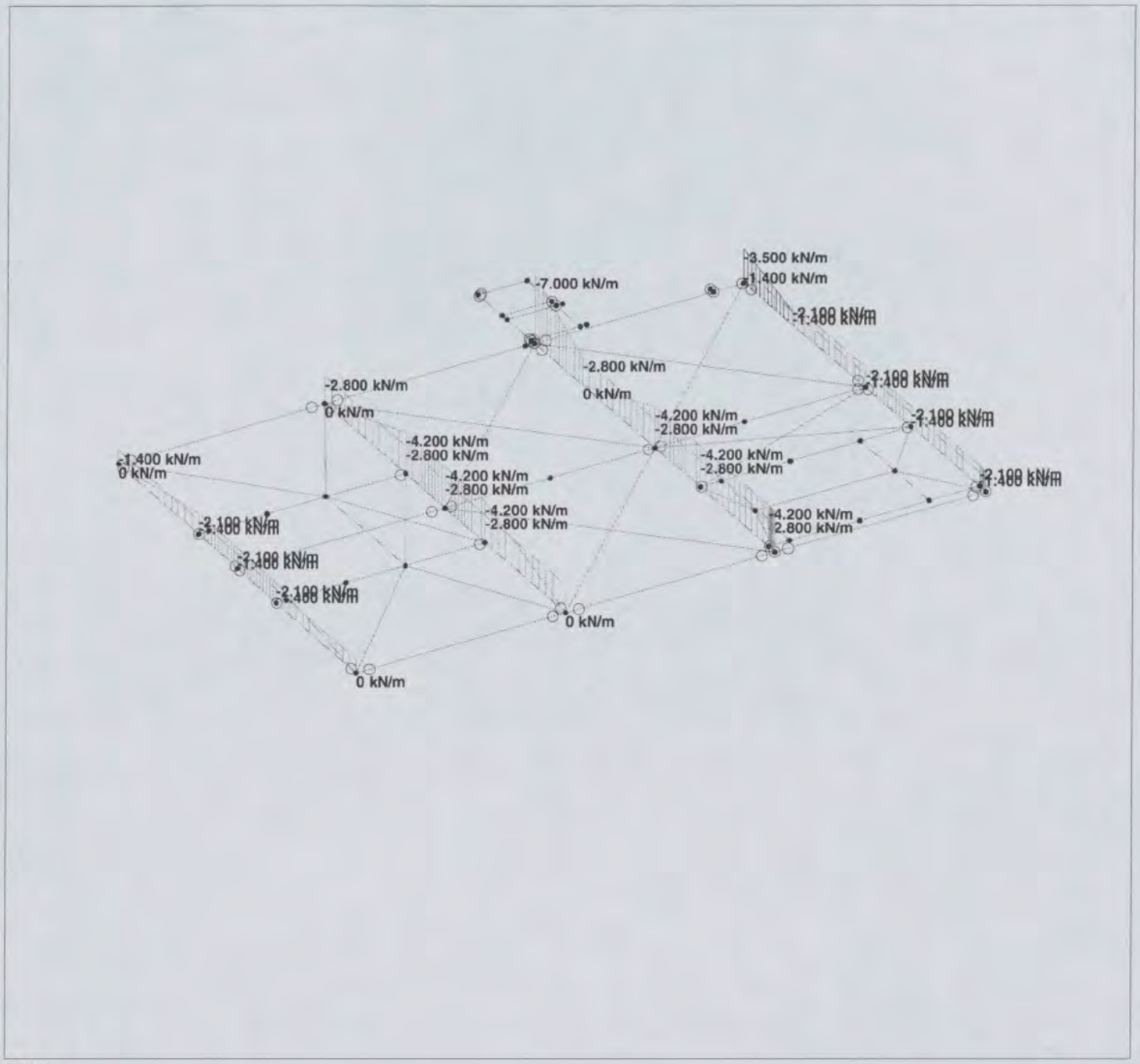
-5.000 kN/m
2.500 kN/m
2.500 kN/m
-5.000 kN/m
-5.000 kN/m
2.500 kN/m
-5.000 kN/m
-5.000 kN/m
2.500 kN/m

BG 2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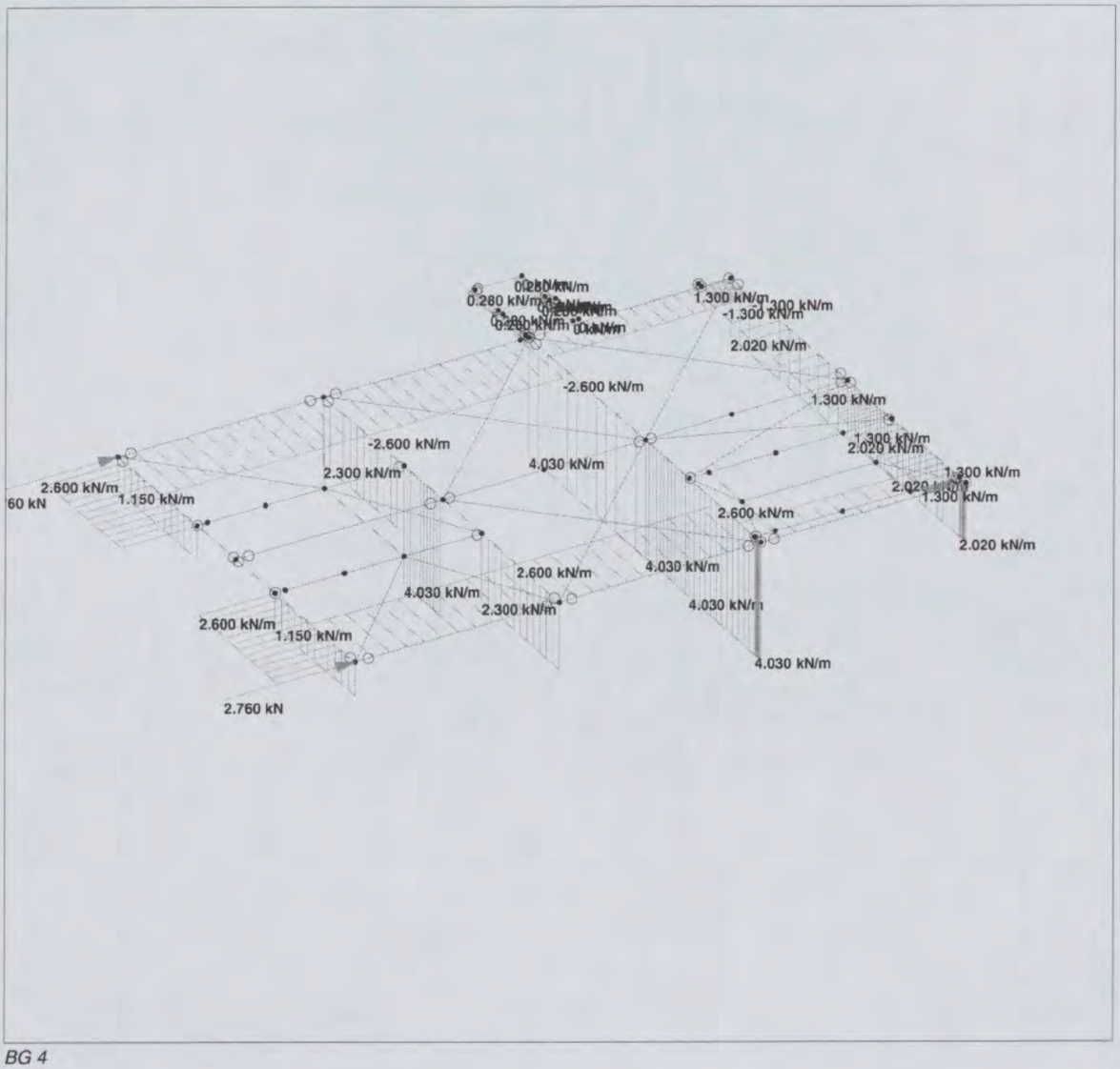
3.500 kN/m
1.400 kN/m
-2.800 kN/m
0 kN/m
-4.200 kN/m
-2.800 kN/m
-1.400 kN/m
0 kN/m
-2.100 kN/m
0 kN/m

BG 3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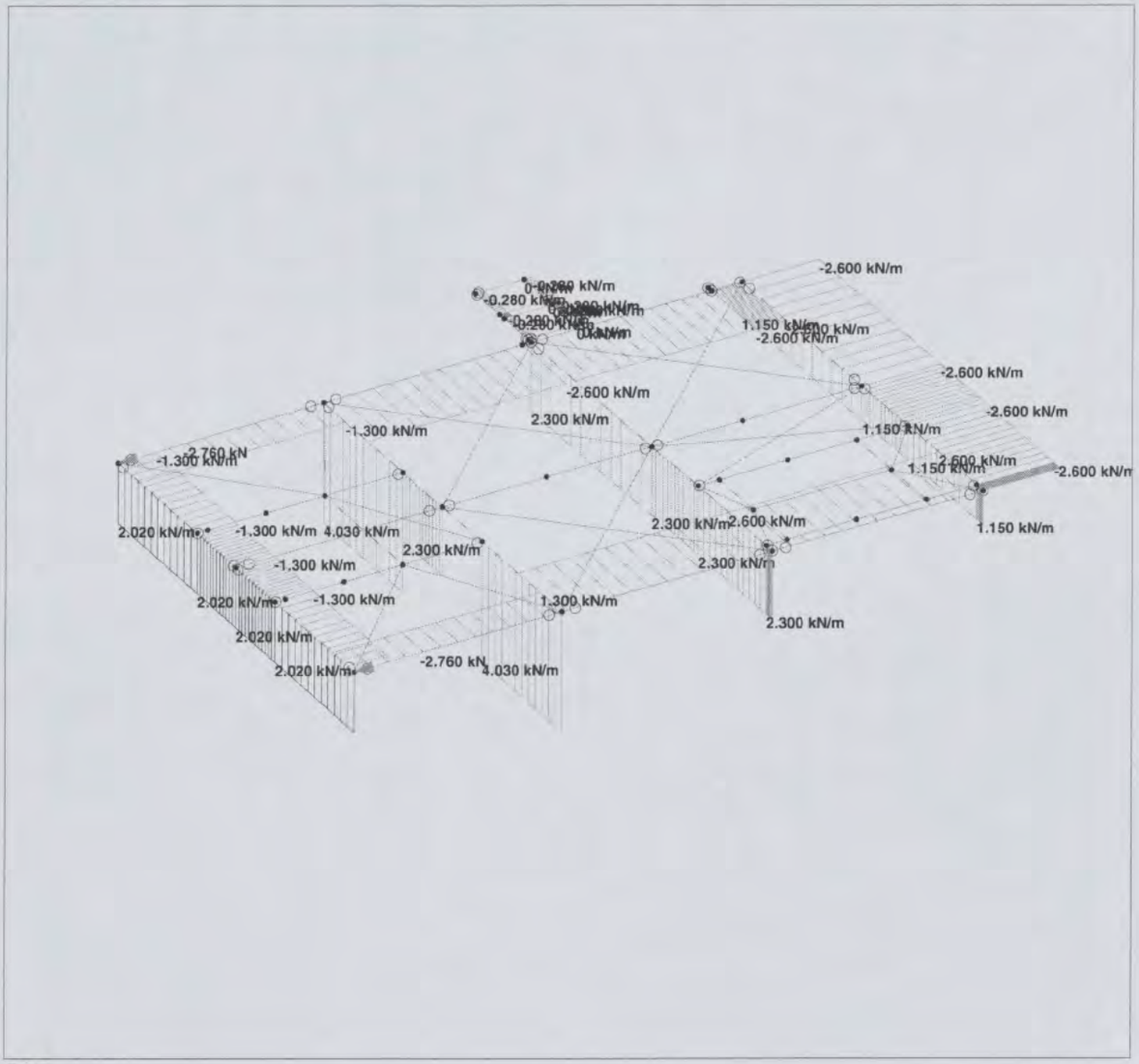
1.300 kN/m
2.020 kN/m
-2.600 kN/m
2.300 kN/m
4.030 kN/m
2.600 kN/m
1.150 kN/m
60 kN
1.300 kN/m
2.020 kN/m
1.300 kN/m
2.600 kN/m
2.020 kN/m
2.600 kN/m
4.030 kN/m
4.030 kN/m
2.300 kN/m
2.600 kN/m
1.150 kN/m
4.030 kN/m
2.760 kN

BG 4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-2.600 kN/m
-2.600 kN/m
-2.600 kN/m
2.300 kN/m
-1.300 kN/m
1.150 kN/m
-2.760 kN
-1.300 kN/m
2.020 kN/m
-1.300 kN/m
4.030 kN/m
2.300 kN/m
2.300 kN/m
2.600 kN/m
1.150 kN/m
-1.300 kN/m
2.300 kN/m
2.020 kN/m
-1.300 kN/m
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2.020 kN/m
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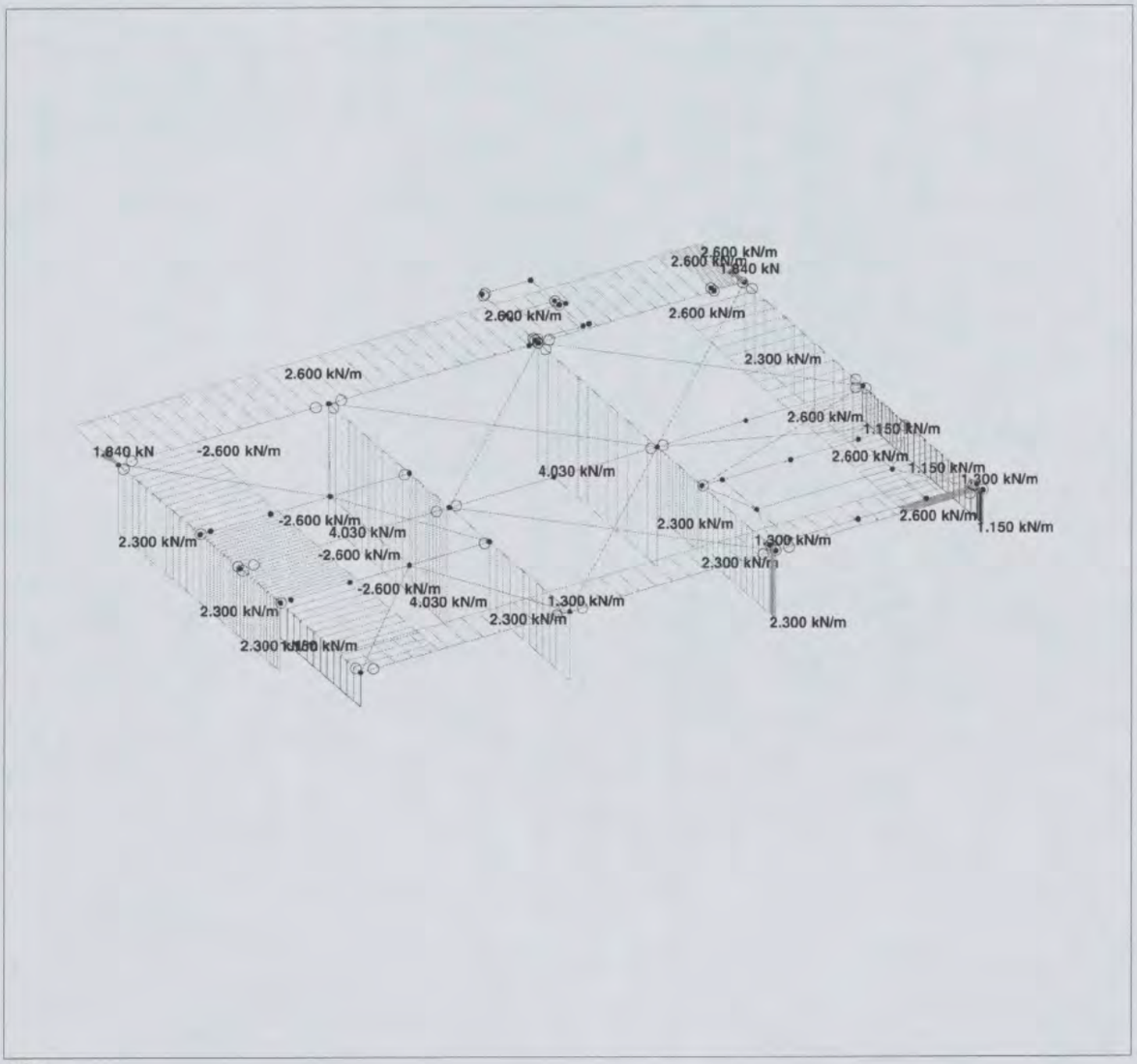
4.030 kN/m

BG 5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2.600 kN/m
1.840 kN
2.600 kN/m
2.600 kN/m
2.300 kN/m
2.600 kN/m
1.150 kN/m
1.840 kN
-2.600 kN/m
4.030 kN/m
2.600 kN/m
1.150 kN/m
300 kN/m
-2.600 kN/m
4.030 kN/m
2.300 kN/m
2.300 kN/m
2.600 kN/m
1.150 kN/m
1.300 kN/m
-2.600 kN/m
2.300 kN/m
-2.600 kN/m
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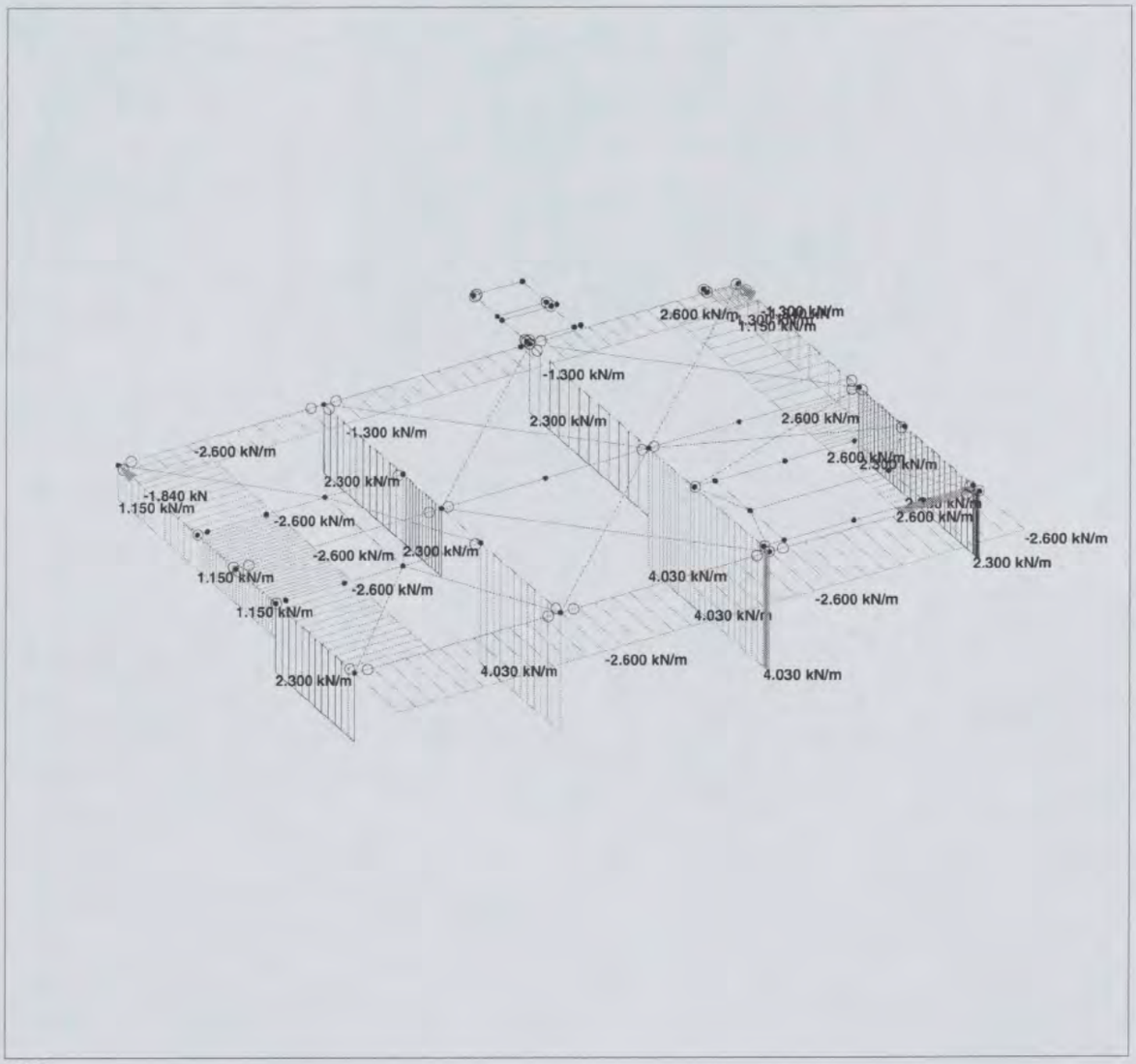
2.300 kN/m

BG 6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2.600 kN/m
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1.150 kN/m
2.300 kN/m
-2.600 kN/m
-2.600 kN/m
2.300 kN/m
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1.150 kN/m
4.030 kN/m
-2.600 kN/m
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4.030 kN/m
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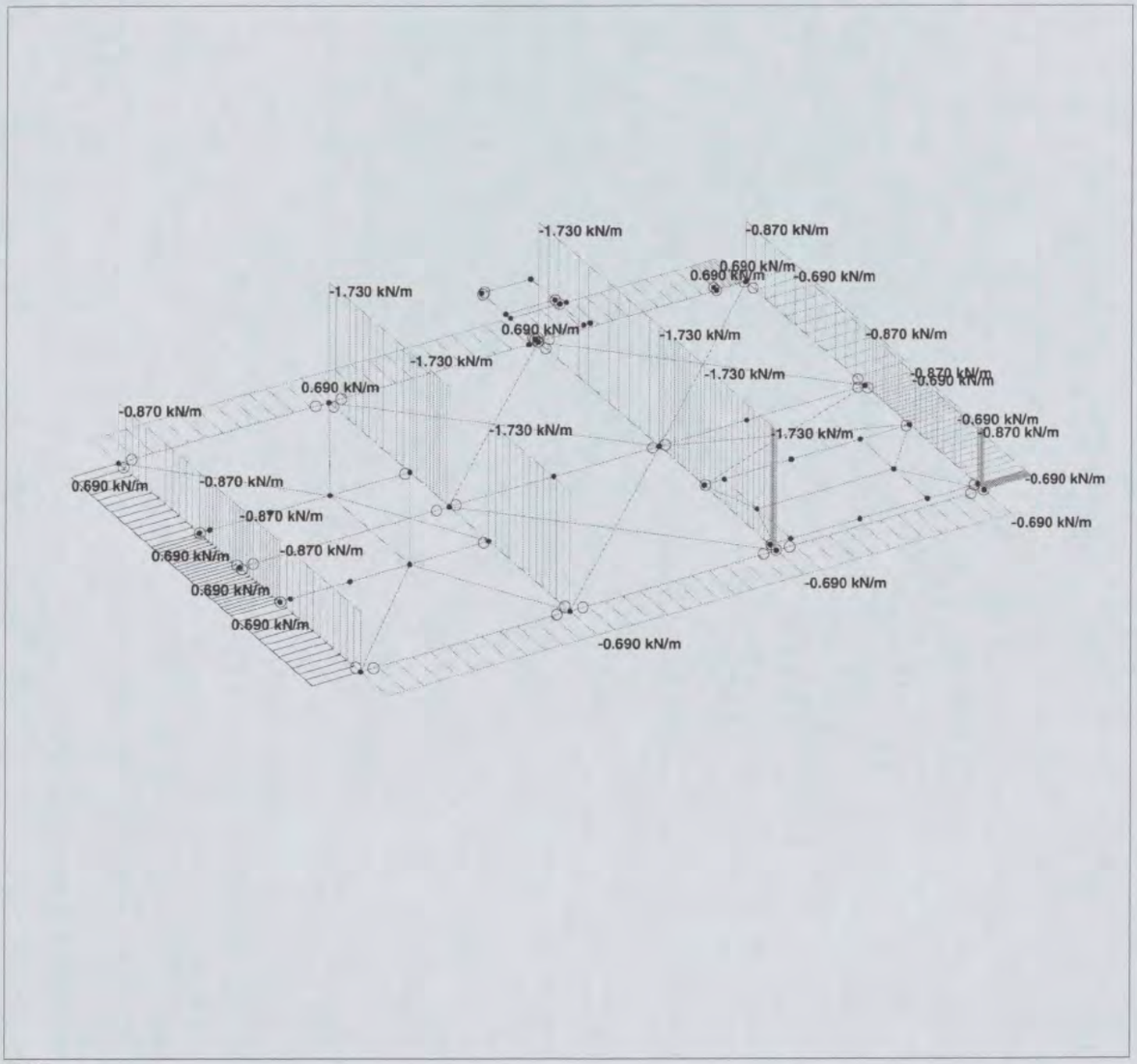
4.030 kN/m
-2.600 kN/m
4.030 kN/m

BG 7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0.690 kN/m
-0.690 kN/m
-1.730 kN/m
0.690 kN/m
-1.730 kN/m
-0.870 kN/m
-1.730 kN/m
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0.690 kN/m
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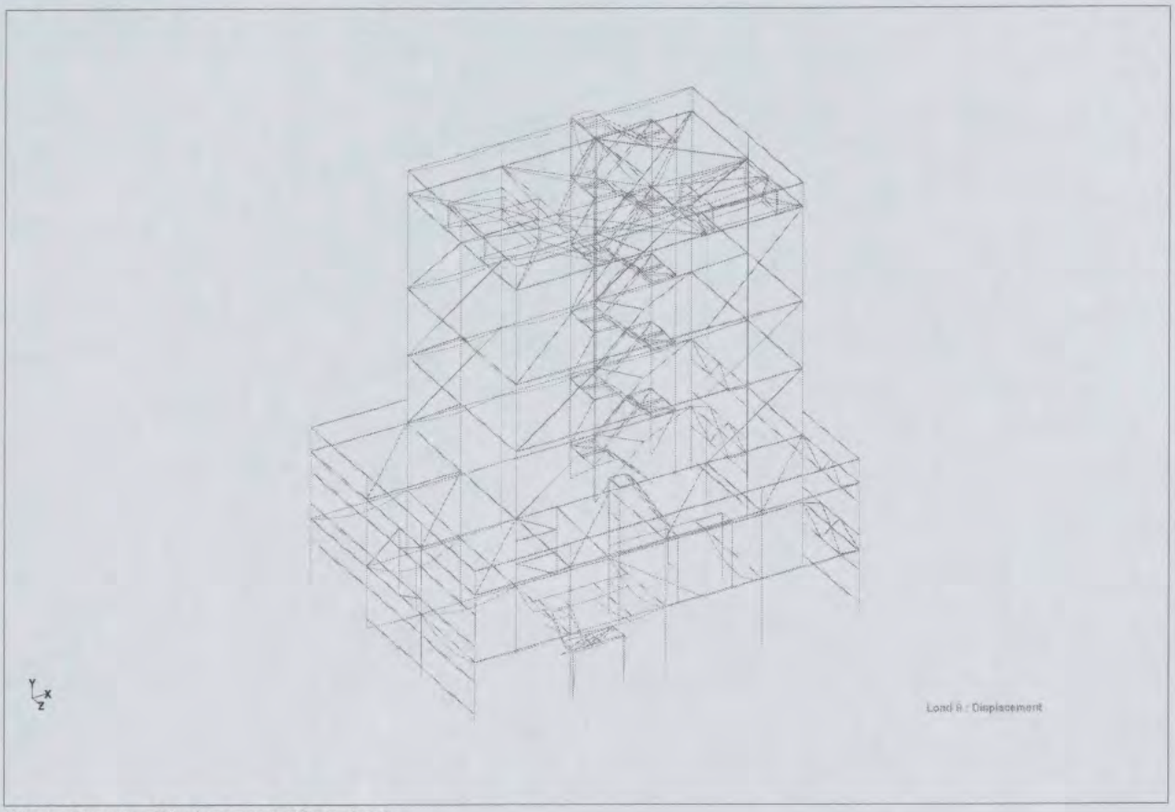
0.690 kN/m
-0.870 kN/m
-0.690 kN/m
0.690 kN/m
-0.690 kN/m
0.690 kN/m
-0.690 kN/m

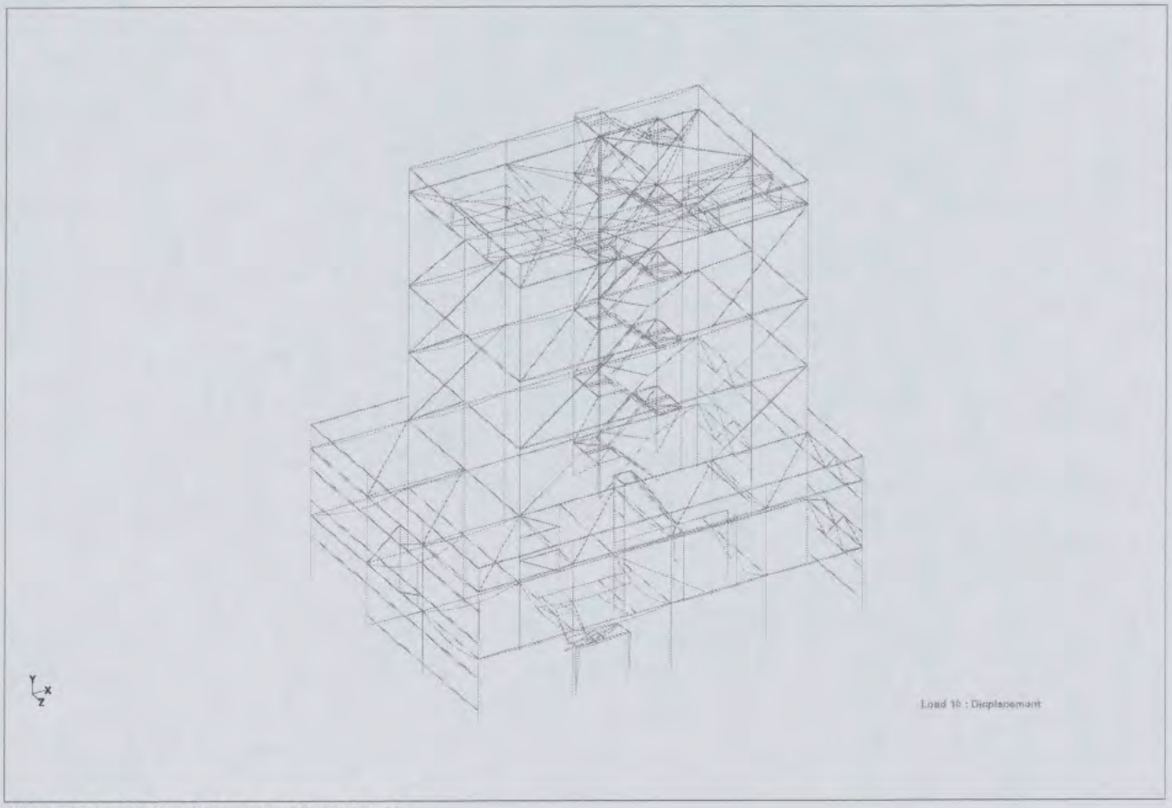
BG 8

CUMAE B.V. **Model Model 8 - 12-12-2007** Software licensed to Cumae B.V.	Job No **20051248.B**	Sheet No **200**	Rev
	Part STAALCONSTRUCTIE PROEFFABRIEK		
Job Title SHELL GLOBAL SOLUTIONS	Ref 04B020		
	By [redacted] Date 07-Jun-07	Chd [redacted]	
Client [redacted]	File Model 8.std	Date/Time 10-Dec-2007 14:22	



Whole Structure Displacements 25mm:1m 9

CUMAE B.V. **Model Model 8 - 12-12-2007** Software licensed to Cumae B.V.	Job No **20051248.B**	Sheet No **201**	Rev
	Part STAALCONSTRUCTIE PROEFFABRIEK		
Job Title SHELL GLOBAL SOLUTIONS	Ref 04B020		
	By [redacted] Date 07-Jun-07 Chd [redacted]		
Client [redacted]	File Model 8.std	Date/Time 10-Dec-2007 14:22	



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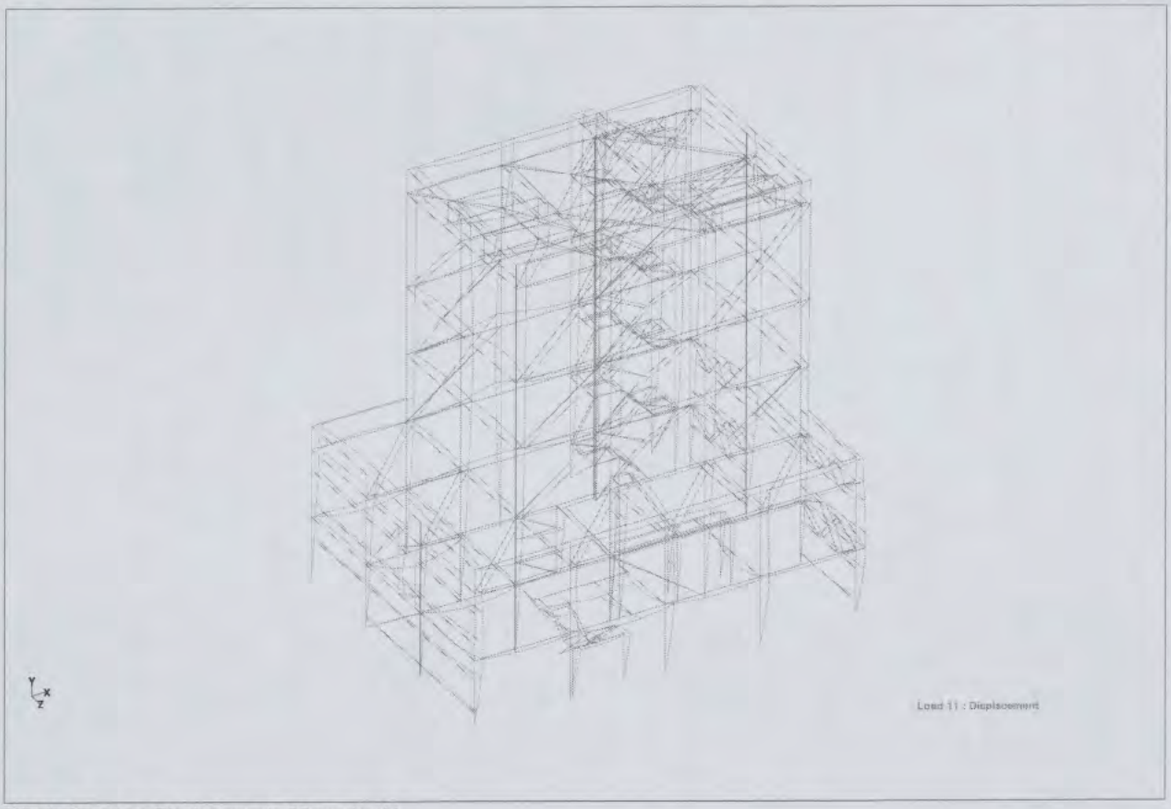

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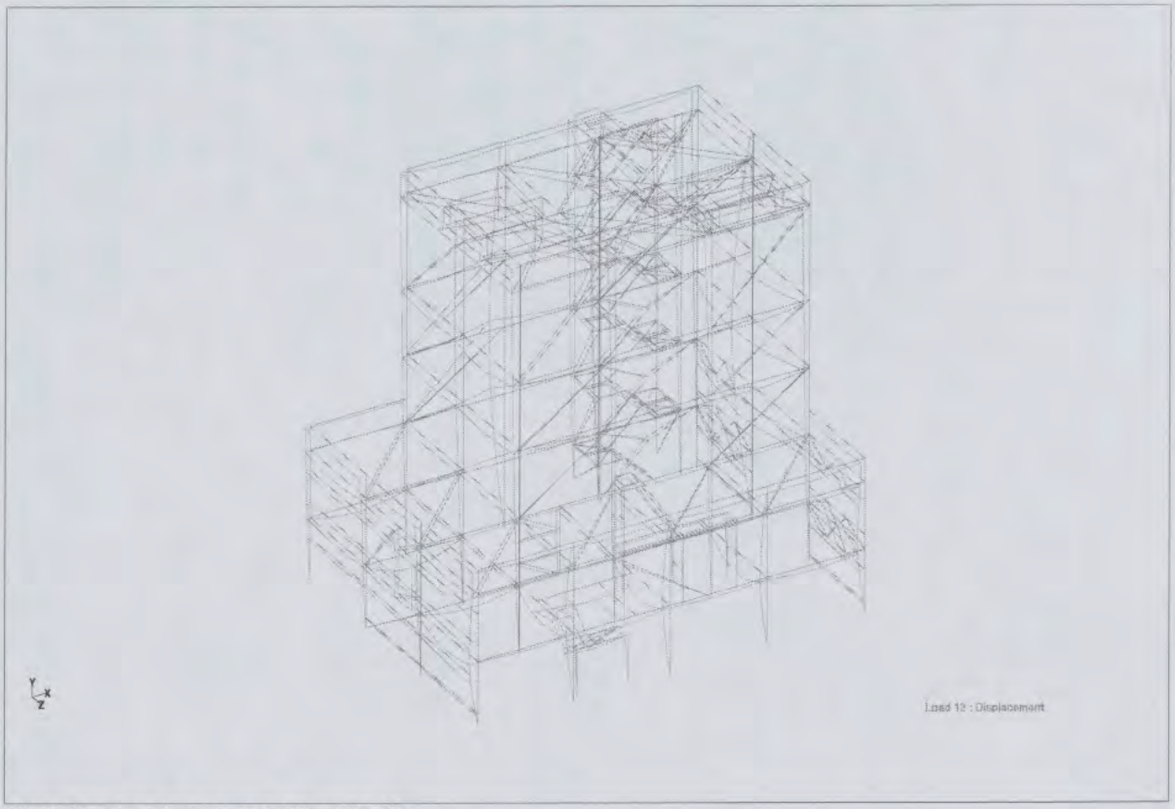

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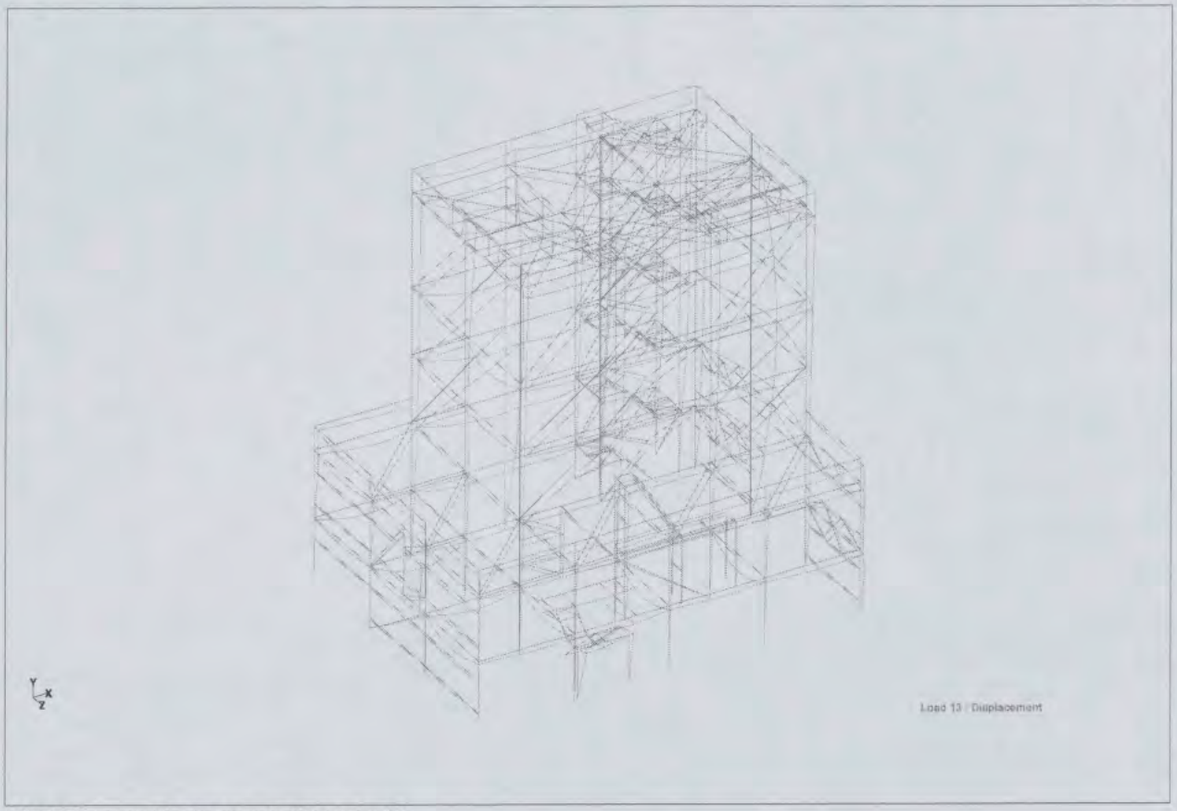
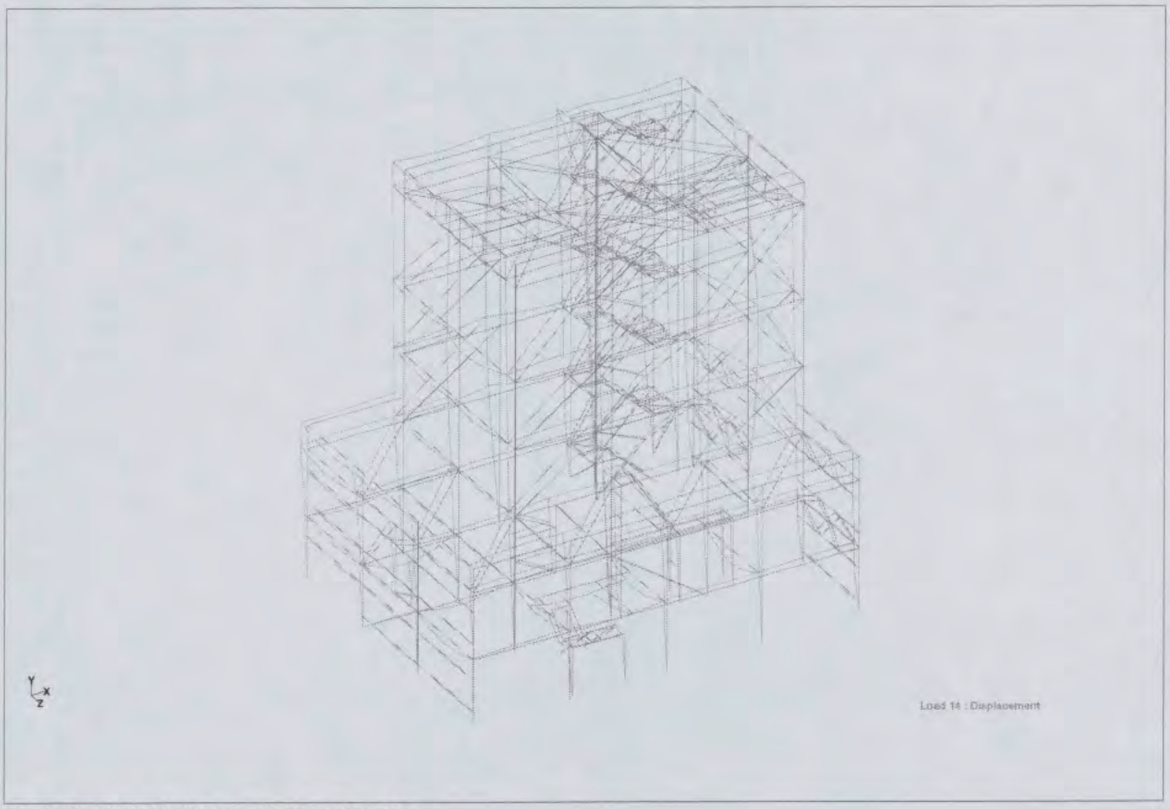
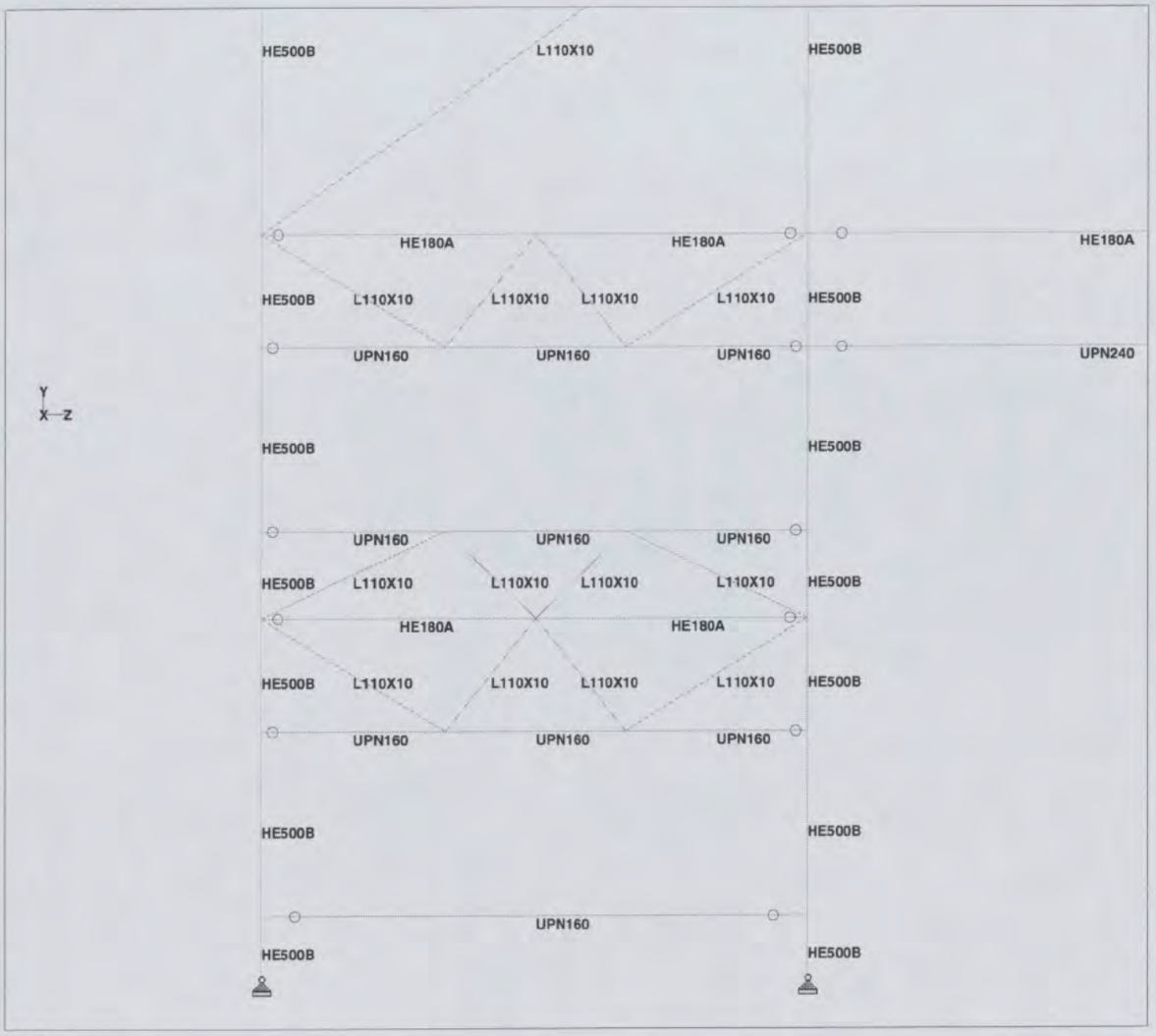


Whole Structure Displacements 25mm:1m 13

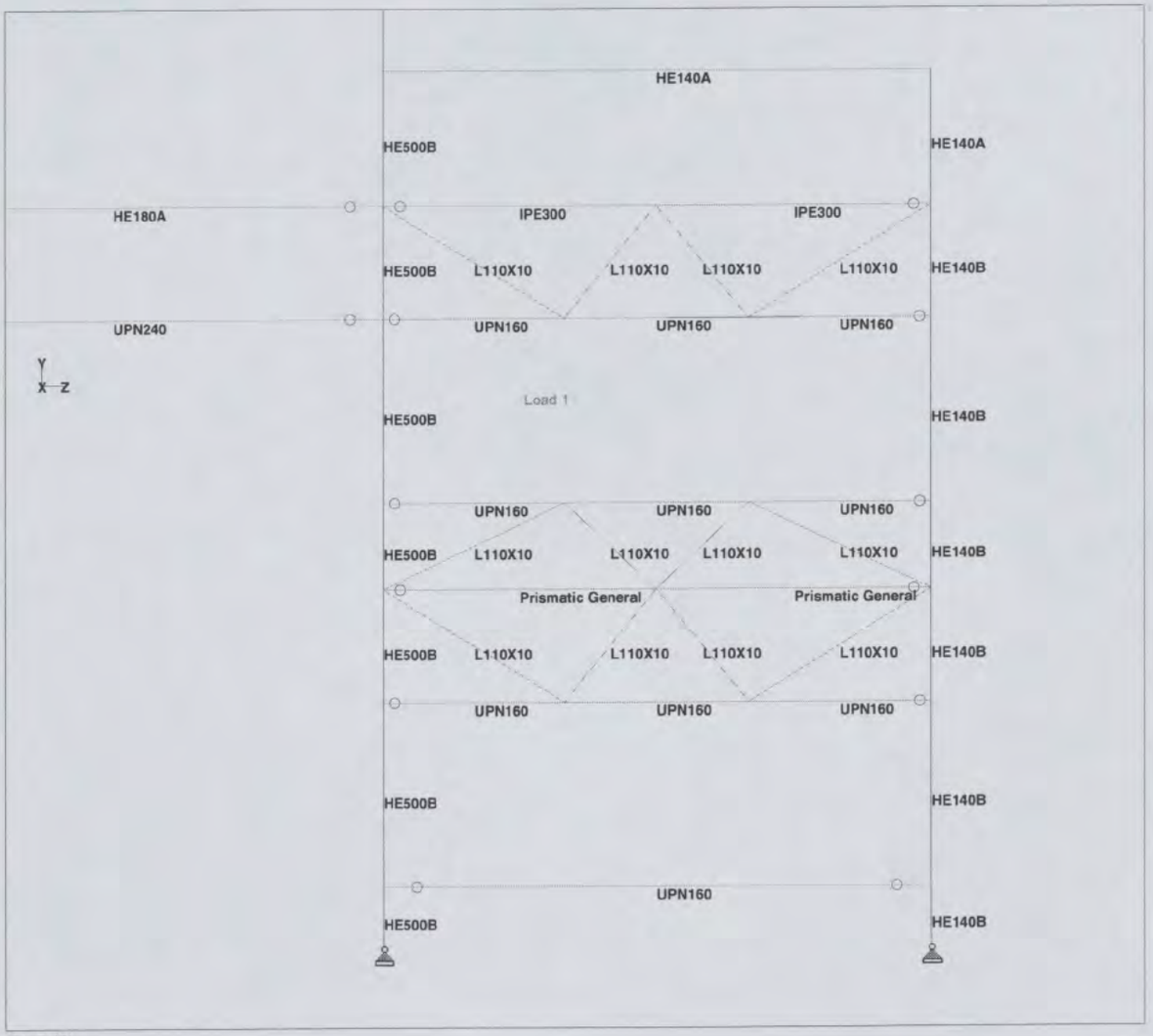
the scale towards document



Whole Structure Displacements 25mm:1m 14


HE500B
L110X10
HE500B
HE180A
HE180A
HE180A
HE500B
L110X10
L110X10
L110X10
L110X10
HE500B
UPN160
UPN160
UPN160
UPN240
Y
X
Z
HE500B
HE500B
UPN160
UPN160
UPN160
HE500B
L110X10
L110X10
L110X10
L110X10
HE500B
HE180A
HE180A
HE500B
L110X10
L110X10
L110X10
L110X10
HE500B
UPN160
UPN160
UPN160
HE500B
HE500B
UPN160
HE500B
HE500B

As 5


HE140A
HE500B
HE140A
HE180A
IPE300
IPE300
HE500B
L110X10
L110X10
L110X10
L110X10
HE140B
UPN240
UPN160
UPN160
UPN160
Y
X Z
Load 1
HE500B
HE140B
UPN160
UPN160
UPN160
HE500B
L110X10
L110X10
L110X10
L110X10
HE140B
Prismatic General
Prismatic General
HE500B
L110X10
L110X10
L110X10
L110X10
HE140B
UPN160
UPN160
UPN160
HE500B
HE140B
UPN160
HE500B
HE140B

As 5 (2)


HE140A
HE140A
HE140A
HE140A
HE140A
HE140A
IPE300
IPE300
IPE300
IPE300
HE140B
UPN140
L110X10
HE180B
HE140B
UPN140
UPN140
UPN140
UPN140
Y
X
Z
Load 1
HE140B
L110X10
UPN140
HE180B
HE140B
UPN140
UPN140
UPN140
UPN140
UPN140
HE140B
UPN140
HE180B
HE140B
HE200A
HE200A
HE200A
HE200A
Prismatic General
HE140B
HE180B
HE140B
UPN140
UPN140
UPN140
L110X10
HE140B
HE180B
HE140B
UPN140
UPN140
HE140B
HE180B
HE140B

Rij 1

Aanvullende berekeningen i.v.m. de wijzigingen aan het vertikaal stabiliteitsverband van het gebouw Shell Global te Amsterdam

opdrachtgever : Mourik B.V.

[redacted]

N 0 1 / 0 1 7 2006

[redacted]

CONSTRUCTIE AKKOORD

[redacted]

Project	: Shel Global	
Projectnr.	: 20051248.B	
Referentie	: 20051248.BRP00016.DOC	
Auteur(s)	: [redacted]	Par. :
Gecontroleerd	:	Par. :
Geautoriseerd*	:	Par. :
Datum	: 12 december 2007	
Status	: Definitief	
Revisie	: 0	

*Een document dat niet voor autorisatie geparafeerd is, mag slechts gebruikt worden als voorinformatie.

Arnhem, Rotterdam, Aruba

Bureaulid ONRI

Alle opdrachten worden aanvaard en uitgevoerd overeenkomstig de 'regeling van de verhouding tussen de opdrachtgever en adviserend ingenieursbureau' (RVOI), dan wel 'De Nieuwe Regeling 2005' (DNR 2005). Een exemplaar van deze leveringsvoorwaarden is op uw verzoek bij ons verkrijgbaar.



Location of the original report
I:\20051248.B\Rp\

Principal: Mourik

Verification sheet					
Title	Aanvullende berekening staalconstructie proeffabriek Shell Global Solutions				
Identification	20051248.BRP00016				
Status	Definitief				
Revision	0				
Date of revision	12-12-2007				
Intermediate results					
IR date					
		Initials	Signature	Date	Check level
Made	Calculator	[redacted]			2
Checked	Checker	[redacted]			
Checked	Checker				
Checked	Checker				
Authorised	Project leader	[redacted]			
Approved	Principal's representative				

Check level 1: check on starting points, conditions and results
Check level 2: as check level 1, extended by going through the calculations
Check level 3: completely independent recalculation
Check level 4: independent assessment by third party

INHOUDSOPGAVE

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Image Engineering Scan Reference Chart TE263 Serial No. 380

1 SAMENVATTING

Op verzoek van Mourik zijn de verticale stabiliteitsverbanden in as 5, tussen as A en B, tussen as C en D, tussen 250+ en 7000+; in as 1, tussen as B en C, tussen as 3500+ en 7000+; in as C, tussen as 2 en 3, tussen 3500+ en 7000+, zodanig aangepast dat de daar aanwezige ramen een geheel vrij doorzicht hebben.

2 REFERENTIES

2.1 Gebruikte tekeningen

Tekening: Staalplan 2.dwg.

2.2 Gebruikte normen

NEN 6702	Belastingen en vervormingen	TGB 1990
NEN 6770	Staalconstructies	TGB 1990 Basis eisen
NEN 6771	Staalconstructies	TGB 1990 Stabiliteit
NEN 6772	Staalconstructies	TGB 1990 Verbindingen

NVN-ENV 1993-1-1: Eurocode 3: Deel 1-1: Ontwerp en berekening van staalconstructies. Algemene regels en regels voor gebouwen
NVN-ENV 1993-1-1/A2: Eurocode 3: Deel 1-1: Wijzigingsblad
NAD-NVN-ENV 1993-1-1: Richtlijnen voor het gebruik van NVN-ENV 1993-1-1 Eurocode 3.

2.3 Methode van berekenen

Voor de berekening is gebruik gemaakt van het eindige elementenpakket: STAAD.Pro for Windows Release 2006. Toetsingen van de staven volgens Eurocode 3 (Staal).



2.4 Materialen

Staalconstructie
Kwaliteit: S 235 JRG2 volgens NEN 6770-9.1.2:tabel 2:
Voor t <= 40 mm

$f_{y;rep}$	=	235	N/mm^2
$f_{t;rep}$	=	360	N/mm^2
E_{rep}	=	210000	N/mm^2
G_{rep}	=	81000	N/mm^2

2.5 Veiligheidsfactoren

Zie NEN 6702:

Veiligheidsklasse 3	$\gamma f;q$	=	1.5
	$\gamma f;g$	=	1.2 (Normaal)
	$\gamma f;g$	=	0.9 (Ongunstig)
	$\gamma f;g$	=	1.35

Referentieperiode: 50 jaar

2.6 Doorbuigingseisen

Zie ook NEN 6702:10.2: Eisen m.b.t. bijkomende doorbuiging
- Vloeren: $u_{bij} <= 0.003*l_{rep}$
- Vloeren die scheidingswanden dragen: $u_{bij} <= 0.002*l_{rep}$
- Daken: $u_{bij} <= 0.004*l_{rep}$

Zie ook NEN 6702:10.3: Eisen m.b.t. doorbuiging in de eindtoestand
- Totale horizontale doorbuiging van gebouwen met 1 bouwlaag:
  - Voor gebouwen: $u_h <= h/300$
- Totale horizontale doorbuiging van gebouwen met meer dan 1 bouwlaag:
  - Voor gebouwen: $u_h <= h/500$

Zie ook NEN 6702:10.4: Eisen m.b.t. doorbuiging in de eindtoestand
- Vloeren: $u_{bij} <= 0.004*l_{rep}$
- Daken: $u_{bij} <= 0.004*l_{rep}$

3 BELASTINGEN

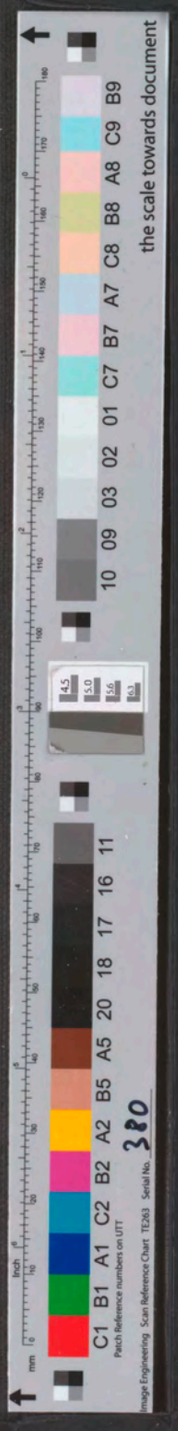
Voor de belastingen en belastingscombinaties wordt verwezen naar rapport nr. 20051248.BRP00004.doc: “Statische berekeningen aan de staalconstructie van de proeffabriek van Shell Global Solutions te Amsterdam” rev. 2 d.d. 1 mei 2007.

4 CONCLUSIES

De gewijzigde verticale stabiliteitsverbanden voldoen aan de eisen van het bouwbesluit.

5 BIJLAGEN

Model 8 Deel 1.pdf	Computer berekening deel 1
Model 8 Deel 2.pdf	Computer berekening deel 2



1 Hoekijzer met boutverbinding, belast op trek

Eenheden: N mm Zie ook NEN 6770:13.3.4.2.
Belastingen volgens de uiterste grenstoestand.

Opmerking:
Onderstaande berekening is niet geldig indien de bouten in het kleinste been van het hoekijzer zijn bevestigd.

2 Hoekijzer gegevens

Dikte van de flens:	t := 10
Breedte van de flens waarin de boutverbinding zich bevindt:	b := 110
Randafstand bout in langsrichting	e1 := 50
Randafstand bout in dwarsrichting	e2 := 55
Steek van de boutgaten in langsrichting	s1 := 100
Bruto oppervlak van het hoekijzer	A := 2120
Vloeigrens van het hoekijzer materiaal:	fy := 235
Treksterkte van het hoekijzer materiaal:	ftd := 360

[redacted]

3 Bout-gegevens

Diameter van de bouten:	dbnom := 20
Diameter van de boutgaten:	dgnom := 22
Aantal bouten per verbinding:	n := 2
Spanningsdoorsnede van de bout:	Abs := 245
Reductiefactor αred1:	αred1 := 1.0
Reductiefactor αred2:	αred2 := 1.0
Treksterkte van het boutmateriaal:	ftbd := 800

[redacted]

4 Belastingen

Trekkkracht in het hoekijzer [N] Ntsd := 175000

5 Berekening ugt

Grensafschuiving per bout: Fvud := 0.48·αred2·ftbd·Abs Fvud = 9.408×10^4

Grensstuikkracht per bout: Fcud := 2·1.0·αred1·fy·dbnom·t Fcud = 9.4×10^4

6 Toetsing van de bouten:

Op afschuiving: $u1 := \frac{Ntsd}{Fvud \cdot n}$ u1 = 0.93

op stuik: $u2 := \frac{Ntsd}{Fcud \cdot n}$ u2 = 0.931

7 Toetsing van het hoekijzer:

Netto doorsnede van het hoekijzer: $Anet := A - dgnom \cdot t$ $Anet = 1900$

Bepaling van β2, zie ook NEN 6770:Tabel 31:

$$\beta 2 := \begin{cases} 0.4 & \text{if } s1 \le 2.5 \cdot dgnom \\ 0.7 & \text{if } s1 \ge 5 \cdot dgnom \\ 0.4 + 0.2 \cdot \dfrac{s1 - 2.5 \cdot dgnom}{2.5 \cdot dgnom} & \text{otherwise} \end{cases} \qquad \beta 2 = 0.564$$

Bepaling van β3, zie ook NEN 6770:Tabel 31:

$$\beta 3 := \begin{cases} 0.5 & \text{if } s1 \le 2.5 \cdot dgnom \\ 0.7 & \text{if } s1 \ge 5 \cdot dgnom \\ 0.4 + 0.3 \cdot \dfrac{s1 - 2.5 \cdot dgnom}{2.5 \cdot dgnom} & \text{otherwise} \end{cases} \qquad \beta 3 = 0.645$$

Bepaling van Ntud, zie ook NEN 6770:Tabel 31:

$$Ntud := \begin{cases} 1.6 \cdot \left(e2 - \dfrac{dgnom}{2} \right) \cdot t \cdot ftd & \text{if } n = 1 \\ 0.8 \cdot \beta 2 \cdot Anet \cdot ftd & \text{if } n = 2 \\ 0.8 \cdot \beta 3 \cdot Anet \cdot ftd & \text{if } n \ge 3 \end{cases} \qquad Ntud = 3.084 \times 10^5$$

Toetsing op netto doorsnede: $u3 := \dfrac{Ntsd}{Ntud}$ $u3 = 0.567$

1 Hoekijzer met boutverbinding, belast op trek

Eenheden: N mm Zie ook NEN 6770:13.3.4.2.
Belastingen volgens de uiterste grenstoestand.

Opmerking:
Onderstaande berekening is niet geldig indien de bouten in het kleinste been van het hoekijzer zijn bevestigd.

2 Hoekijzer gegevens

Dikte van de flens:	$t := 10$
Breedte van de flens waarin de boutverbinding zich bevindt:	$b := 110$
Randafstand bout in langsrichting	$e1 := 50$
Randafstand bout in dwarsrichting	$e2 := 55$
Steek van de boutgaten in langsrichting	$s1 := 110$
Bruto oppervlak van het hoekijzer	$A := 2120$
Vloeigrens van het hoekijzer materiaal:	$fy := 235$
Treksterkte van het hoekijzer materiaal:	$ftd := 360$

3 Bout-gegevens

Diameter van de bouten:	$dbnom := 24$
Diameter van de boutgaten:	$dgnom := 26$
Aantal bouten per verbinding:	$n := 3$
Spanningsdoorsnede van de bout:	$Abs := 353$
Reductiefactor αred1:	$\alpha red1 := 1.0$
Reductiefactor αred2:	$\alpha red2 := 1.0$
Treksterkte van het boutmateriaal:	$ftbd := 800$

4 Belastingen

Trekkkracht in het hoekijzer [N] $Ntsd := 312000$

5 Berekening ugt

Grensafschuiving per bout:	$Fvud := 0.48 \cdot \alpha red2 \cdot ftbd \cdot Abs$	$Fvud = 1.356 \times 10^5$
Grensstuikkracht per bout:	$Fcud := 2 \cdot 1.0 \cdot \alpha red1 \cdot fy \cdot dbnom \cdot t$	$Fcud = 1.128 \times 10^5$

6 Toetsing van de bouten:

Op afschuiving:	$u1 := \frac{Ntsd}{Fvud \cdot n}$	$u1 = 0.767$
op stuik:	$u2 := \frac{Ntsd}{Fcud \cdot n}$	$u2 = 0.922$

7 Toetsing van het hoekijzer:

Netto doorsnede van het hoekijzer: $Anet := A - dgnom \cdot t$ $Anet = 1860$

Bepaling van β2, zie ook NEN 6770:Tabel 31:

$$\beta 2 := \begin{cases} 0.4 & \text{if } s1 \le 2.5 \cdot dgnom \\ 0.7 & \text{if } s1 \ge 5 \cdot dgnom \\ 0.4 + 0.2 \cdot \dfrac{s1 - 2.5 \cdot dgnom}{2.5 \cdot dgnom} & \text{otherwise} \end{cases} \qquad \beta 2 = 0.538$$

Bepaling van β3, zie ook NEN 6770:Tabel 31:

$$\beta 3 := \begin{cases} 0.5 & \text{if } s1 \le 2.5 \cdot dgnom \\ 0.7 & \text{if } s1 \ge 5 \cdot dgnom \\ 0.4 + 0.3 \cdot \dfrac{s1 - 2.5 \cdot dgnom}{2.5 \cdot dgnom} & \text{otherwise} \end{cases} \qquad \beta 3 = 0.608$$

Bepaling van Ntud, zie ook NEN 6770:Tabel 31:

$$Ntud := \begin{cases} 1.6 \cdot \left(e2 - \dfrac{dgnom}{2} \right) \cdot t \cdot ftd & \text{if } n = 1 \\ 0.8 \cdot \beta 2 \cdot Anet \cdot ftd & \text{if } n = 2 \\ 0.8 \cdot \beta 3 \cdot Anet \cdot ftd & \text{if } n \ge 3 \end{cases} \qquad Ntud = 3.255 \times 10^5$$

Toetsing op netto doorsnede: $u3 := \dfrac{Ntsd}{Ntud}$ $u3 = 0.958$